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Foreword

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

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

Version x.y.z

where:

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

1 Scope

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

2 References

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

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

[1]	3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".
[2]	3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
[3]	3GPP TS 38.213: "NR; Physical layer procedures for control".
[4]	3GPP TS 38.215: "NR; Physical layer measurements".
[5]	3GPP TS 38.533: "NR; User Equipment (UE) conformance specification; Radio Resource Management (RRM)".
[6]	3GPP TS 38.211: "NR; Physical channels and modulation".
[7]	3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
[8]	3GPP TS 38.212 "NR; Multiplexing and channel coding".
[9]	3GPP TS 38.202: "NR; Physical layer services provided by the physical layer".
[10]	3GPP TS 38.300: "NR; Overall description; Stage-2".
[11]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[12]	3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
[13]	3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
[14]	3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
[15]	3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".
[16]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".
[17]	3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multiconnectivity", Stage 2.
[18]	3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
[19]	3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[20]	3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[21]	3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".
[22]	3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
[23]	3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
[24]	3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA); Overall description".
[25]	3GPP TS 36.101: "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
[26]	3GPP TS 38.214: "NR; Physical layer procedures for data".
[27]	3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".
[28]	Void.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [11] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [11].

Active DL BWP: Active DL bandwidth part as defined in TS 38.213 [3].

Blackbox Approach: Testing methodology, in which the UE internal implementation of certain specific UE functionality involved in the test, is unknown.

Control Resource Set: As defined in TS 38.213 [3].

DL BWP: DL bandwidth part as defined in TS 38.213 [3].

EN-DC: E-UTRA-NR Dual Connectivity as defined in clause 4.1.2 of TS 37.340 [17].

en-gNB: As defined in TS 37.340 [17].

FR1: Frequency range 1 as defined in clause 5.1 of TS 38.104 [13].

FR2: Frequency range 2 as defined in clause 5.1 of TS 38.104 [13].

gNB: as defined in TS 38.300 [10].

Master Cell Group: As defined in TS 38.331 [2].

Multi-Radio Dual Connectivity: Dual Connectivity between E-UTRA and NR nodes, or between two NR nodes, as defined in TS 37.340 [17].

ng-eNB: As defined in TS 38.300 [10].

NE-DC: NR-E-UTRA Dual Connectivity as defined in clause 4.1.3.2 of TS 37.340 [17].

NGEN-DC: NG-RAN E-UTRA-NR Dual Connectivity as defined in clause 4.1.3.1 of TS 37.340 [17].

NR-DC: NR-NR Dual Connectivity as defined in clause 4.1.3.3 of TS 37.340 [17].

Primary Cell: As defined in TS 38.331 [2].

Quasi Co-Location: As defined in TS 38.214 [26].

RLM-RS resource: A resource out of the set of resources configured for RLM by higher layer parameter RLM-RS-List [2] as defined in TS 38.213 [3].

SA operation mode: Operation mode when the UE is configured with at least PCell and not any MR-DC.

Secondary Cell: As defined in TS 38.331 [2].

Secondary Cell Group: As defined in TS 38.331 [2].

Serving Cell: As defined in TS 38.331 [2].

SMTC: An SSB-based measurement timing configuration configured by *SSB-MeasurementTimingConfiguration* as specified in TS 38.331 [2].

Special Cell: As defined in TS 38.331 [2].

SSB: SS/PBCH block as defined in clause 7.8.3 of TS 38.211 [6].

Timing Advance Group: As defined in TS 38.331 [2].

3.2 Symbols

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

[...] Values included in square bracket must be considered for further studies, because it means that a

decision about that value was not taken.

T_c Basic time unit, defined in clause 4.1 of TS 38.211 [6].

T_s Reference time unit, defined in clause 4.1 of TS 38.211 [6].

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

BFD Beam Failure Detection BFD-RS BFD Reference Signal BLER Block Error Rate

BM-RS Beam Management Reference Signal

BWP Bandwidth Part
CA Carrier Aggregation
CBD Candidate Beam Detection
CC Component Carrier
CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information
CSI-RS CSI Reference Signal
DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal DRX Discontinuous Reception E-CID Enhanced Cell ID

E-UTRA Evolved UTRA
E-UTRAN Evolved UTRAN

EN-DC E-UTRA-NR Dual Connectivity
FDD Frequency Division Duplex

FR Frequency Range

HARQ Hybrid Automatic Repeat Request

HO Handover L1-RSRP Layer 1 RSRP

MAC Medium Access Control
MCG Master Cell Group
MG Measurement Gap
MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MIB Master Information Block

MN Master Node

MR-DC Multi-Radio Dual Connectivity
NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NR-DC NR-NR Dual Connectivity

OFDM Orthogonal Frequency Division Multiplexing
OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel PCC Primary Component Carrier

PCell Primary Cell

PDCCH Physical Downlink Control Channel
PDSCH Physical Downlink Shared Channel
PLMN Public Land Mobile Network

PRACH Physical RACH PSCell Primary SCell

PSS Primary Synchronization Signal pTAG Primary Timing Advance Group PUCCH Physical Uplink Control Channel PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location
RACH Random Access Channel
RAT Radio Access Technology
RLM Radio Link Monitoring
RLM-RS Reference Signal for RLM

RMSI Remaining Minimum System Information

RRC Radio Resource Control
RRM Radio Resource Management
RSSI Received Signal Strength Indicator
RSTD Reference Signal Time Difference
SA Standalone operation mode
SCC Secondary Component Carrier

SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SCS_{SSB} SSB subcarrier spacing
SDL Supplementary Downlink
SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SS-RSRP Synchronization Signal based Reference Signal Received Power SS-RSRQ Synchronization Signal based Reference Signal Received Quality SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels,

measured at the UE antenna connector.

SSS Secondary Synchronization Signal sTAG Secondary Timing Advance Group

SUL	Supplementary Uplink
TA	Timing Advance
TAG	Timing Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex
TTI Transmission Time Interval

UE User Equipment

UL Uplink

3.4 Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. The test specification 38.5xx[x] defines the test tolerances.

Editor's note: intended to capture test tolerances. OTA test tolerance or margin will be captured in this clause if needed.

3.5 Frequency bands grouping

3.5.1 Introduction

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

The frequency bands grouping is derived based on UE REFSENS requirements specified in [18, 19, 20] and assuming 0.5 dB step between the neighbour groups. The groups are defined in the order of increasing REFSENS, i.e., the group A has the smallest REFSENS among the groups. For the same SCS and a given bandwidth, the bands within the same group have the same Io conditions in a corresponding requirement in this specification, provided the bands support this SCS. For different SCSs supported by a frequency band and the same bandwidth, different Io conditions may apply for the frequency band in the requirements, while the band group is the same, based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported SCSs for this bandwidth. For the same SCS but different supported bandwidths, the group for a band is determined based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported bandwidths.

3.5.2 NR operating bands in FR1

NR frequency bands grouping for FR1 is specified in Table 3.5.2-1.

Table 3.5.2-1: NR frequency band groups for FR1

Group	NR FDD		NR TDD		NR SDL	
	Band group notation	Operating bands	Band group notation	Operating bands	Band group notation	Operating bands
Α	NR_FDD_FR1_A	n1, n70, n74 ⁴	NR_TDD_FR1_A	n34, n38, n39, n40, n50, n51	NR_SDL_FR1_A	n75, n76
В	NR_FDD_FR1_B	n66, n74 ³	NR_TDD_FR1_B	-	NR_SDL_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77 ¹ , n78, n79	NR_SDL_FR1_C	-
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77 ²	NR_SDL_FR1_D	-
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41	NR_SDL_FR1_E	-
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-	NR_SDL_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20, n71	NR_TDD_FR1_G	-	NR_SDL_FR1_G	-
Н	NR_FDD_FR1_H	n25	NR_TDD_FR1_H	-	NR_SDL_FR1_H	-

NOTE 1: Except 3.8 GHz to 4.2 GHz.

NOTE 2: Only 3.8 GHz to 4.2 GHz.

NOTE 3: Except 1475.9 MHz to 1510.9 MHz.

NOTE 4: Only when the band is confined in 1475.9 MHz to 1510.9 MHz.

NOTE 5: These bands are used only in NR carrier aggregation with other NR bands according to NR CA band combinations specified in TS 38.101-1 [18] and TS 38.101-3 [20].

3.5.3 NR operating bands in FR2

NR frequency bands grouping for FR2 is specified in Table 3.5.3-1.

Table 3.5.3-1: NR frequency band groups for FR2

Group	Band group notatio	n Operating bands
Α	NR_TDD_FR2_A	n257 ¹ , n258 ¹ , n261 ¹
В	NR_TDD_FR2_B	n257 ⁴ , n258 ⁴ , n261 ⁴
С	NR_TDD_FR2_C	
D	NR_TDD_FR2_D	
Е	NR_TDD_FR2_E	
F	NR_TDD_FR2_F	n260⁴
G	NR_TDD_FR2_G	n260 ¹
Н	NR_TDD_FR2_H	
I	NR_TDD_FR2_I	
J	NR_TDD_FR2_J	
K	NR_TDD_FR2_K	
L	NR_TDD_FR2_L	n257 ² , n258 ² , n261 ²
M	NR_TDD_FR2_M	
N	NR_TDD_FR2_N	
0	NR_TDD_FR2_O	
Р	NR_TDD_FR2_P	
Q	NR_TDD_FR2_Q	
R	NR_TDD_FR2_R	
S	NR_TDD_FR2_S	
Т	NR_TDD_FR2_T	n257 ³ , n258 ³ , n261 ³
U	NR_TDD_FR2_U	
V	NR_TDD_FR2_V	
W	NR_TDD_FR2_W	
X	NR_TDD_FR2_X	
Υ	NR_TDD_FR2_Y	n260 ³
	UE power class 1.	
	UE power class 2.	
	UE power class 3.	
NOTE 4:	UE power class 4.	

3.6 Applicability of requirements in this specification version

In this specification,

- 'cell', 'PCell', 'PSCell' and 'SCell' refer to NR cell, NR PSCell, NR PSCell, and NR SCell,
- E-UTRA cells are referred to as 'E-UTRA cell', 'E-UTRA PCell', 'E-UTRA PSCell', and 'E-UTRA SCell',
- E-UTRA-NR dual connectivity where E-UTRA is the master is referred to as 'E-UTRA-NR dual connectivity' or 'EN-DC'.
- NR-NR dual connectivity which involves two gNB acting as Master gNB and Secondary gNB is referred to as "NR-NR dual connectivity" or "NR-DC". NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.
- 'active serving cell' refers to PCell, PSCell and activated SCells

For UE configured with supplementary UL, the requirements in clause 7.1 and 7.3 shall also apply to uplink transmissions on supplementary UL.

3.6.1 RRC connected state requirements in DRX

For the requirements in RRC connected state specified in this version of the specification, the UE shall assume that no DRX is used provided the following conditions are met:

- DRX parameters are not configured or
- DRX parameters are configured and
 - drx-InactivityTimer is running or
 - drx-RetransmissionTimerDL is running or
 - drx-RetransmissionTimerUL is running or
 - ra-ContentionResolutionTimer is running or
 - a Scheduling Request sent on PUCCH is pending or
 - a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the preamble not selected by the MAC entity

Otherwise the UE shall assume that DRX is used.

3.6.2 Number of serving carriers

3.6.2.1 Number of serving carriers for SA

Requirements for standalone NR with NR PCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 8 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 1 UL (or 2 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

3.6.2.2 Number of serving carriers for EN-DC

Requirements for EN-DC operation of E-UTRA and NR with E-UTRA PCell and NR PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PSCell and up to 1 UL (or 2 UL if SUL is configured) in SCell in different FR with PSCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for EN-DC in the MCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.3 Number of serving carriers for NE-DC

Requirements for NE-DC operation of NR and E-UTRA with NR PCell and E-UTRA PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 1 UL (or 2 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for NE-DC in the SCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.4 Number of serving carriers for NR-DC

Requirements for NR-DC are applicable for the UE configured with the following number of serving NR CCs:

- up to 2 NR DL CCs in total in FR1, up to 8 NR DL CCs in total in FR2, with 1 in PCell, 1 UL in PSCell, and up to 1 UL in each SCell.

3.6.3 Applicability for intra-band FR2

For the requirements in RRC connected state specified in this version of the specification, UE shall assume that the transmitted signals from the serving cells should have the same downlink spatial domain transmission filter on one OFDM symbol in the same band in FR2. Otherwise, the UE is not supposed to satisfy any requirements for SCell.

3.6.4 Applicability for FR2 UE power classes

For the requirements of each FR2 power class specified in this version of the specification, certain UE types with specific device architectures are assumed. The UE types can be found in TS 38.101-2 [19].

3.6.5 Applicability for SDL bands

The measurements accuracy requirements for SDL bands in this version of specification in clause 10.1 shall apply for NR intra-frequency measurements on SCC (SS-RSRP, SS-RSRQ, SS-SINR, and L1-RSRP) and inter-frequency measurements (SS-RSRP, SS-RSRQ, and SS-SINR).

3.6.6 Applicability of requirements for NGEN-DC operation

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

3.6.7 Applicability of QCL

For the requirements specified in this version of the specification, a reference signal is considered to be QCLed to another reference signal if it is in the same TCI chain as the other reference signal, provided that the number of Reference Signals in the chain is no more than 4.

A TCI chain consists of an SSB, and one or more CSI-RS resources, and the TCI state of each Reference Signal includes another Reference Signal in the same TCI chain.

DMRS of PDCCH or PDSCH is QCLed with the reference signal in its active TCI state and any other reference signal that is QCLed, based on above criteria, with the reference signal in the active TCI state.

4 SA: RRC_IDLE state mobility

Editor's note: intended to capture the RRM requirements for RRC_IDLE state in stand-alone operation.

4.1 Cell Selection

After a UE has switched on and a PLMN has been selected, the Cell selection process takes place, as described in TS 38.304. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process, the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

4.2 Cell Re-selection

4.2.1 Introduction

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

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS 38.304, allowing the UE to limit its measurement activity.

In the requirements of clause 4.2, the exceptions for side conditions apply as follows:

- for the UE capable of CA, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1, B.3.2.3, or B.3.2.5 for UE supporting CA in FR1, CA in FR2 and CA between FR1 and FR2, respectively;
- for the UE capable of SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1.

4.2.2 Requirements

4.2.2.1 UE measurement capability

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

- Intra-frequency carrier, and
- Depending on UE capability, 7 NR inter-frequency carriers, and
- Depending on UE capability, 7 FDD E-UTRA inter-RAT carriers, and
- Depending on UE capability, 7 TDD E-UTRA inter-RAT carriers.

In addition to the requirements defined above, a UE supporting E-UTRA measurements in RRC_IDLE state shall be capable of monitoring a total of at least 14 carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD and NR layers.

4.2.2.2 Measurement and evaluation of serving cell

The UE shall measure the SS-RSRP and SS-RSRQ level of the serving cell and evaluate the cell selection criterion S defined in TS 38.304 [1] for the serving cell at least once every M1*N1 DRX cycle; where:

M1=2 if SMTC periodicity (T_{SMTC}) > 20 ms and DRX cycle ≤ 0.64 second,

otherwise M1=1.

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

If the UE has evaluated according to Table 4.2.2.2-1 in N_{serv} consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information for 10 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1].

Table 4.2.2.2-1: N_{serv}

DRX cycle length [s]	Scaling Factor (N1)		N _{serv} [number of DRX cycles]
	FR1	FR2Note1	
0.32		8	M1*N1*4
0.64	4	5	M1*N1*4
1.28	ı	4	N1*2
2.56		3	N1*2

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.

4.2.2.3 Measurements of intra-frequency NR cells

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

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS38.304 within $T_{\text{detect},NR_Intra}$ when that Treselection= 0. An intra frequency cell is considered to be detectable according to the conditions defined in Annex B.1.2 for a corresponding Band.

The UE shall measure SS-RSRP and SS-RSRQ at least every $T_{measure,NR_Intra}$ (see table 4.2.2.3-1) for intra-frequency cells that are identified and measured according to the measurement rules.

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

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

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined [1] within $T_{\text{evaluate,NR_intra}}$ when $T_{\text{reselection}} = 0$ as specified in table 4.2.2.3-1 provided that:

when rangeToBestCell is not configured:

- the cell is at least 3 dB better ranked in FR1 or 4.5 dB better ranked in FR2.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them.
 - the cell is at least 3dB better ranked in FR1 or [4.5]dB better ranked in FR2 if the current serving cell is among them.

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

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is satisfied with the reselection criteria which are defined in TS38.304 [1], the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

Table 4.2.2.3-1: T_{detect,NR_intra}, T_{measure,NR_intra} and T_{evaluate,NR_intra}

DRX cycle	Scaling Factor (N1)		T _{detect,NR_Intra} [s]	T _{measure,NR_Intra} [S]	Tevaluate,NR_Intra
length [s]	FR1	FR2 ^{Note1}	(number of DRX cycles)	(number of DRX cycles)	[s] (number of DRX cycles)
0.32		8	11.52 x N1 x M2 (36 x N1 x M2)	1.28 x N1 x M2 (4 x N1 x M2)	5.12 x N1 x M2 (16 x N1 x M2)
0.64	1	5	17.92 x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.
 Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1.

4.2.2.4 Measurements of inter-frequency NR cells

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

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.7.

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

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS38.304 within $K_{carrier} * T_{detect,NR_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 5 dB in FR1 or 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities. The parameter $K_{carrier}$ is the number of NR inter-frequency carriers indicated by the serving cell. An inter-frequency cell is considered to be detectable according to the conditions defined in Annex B.1.3 for a corresponding Band.

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

The UE shall measure SS-RSRP or SS-RSRQ at least every $K_{carrier} * T_{measure,NR_Inter}$ (see table 4.2.2.4-1) for identified lower or equal priority inter-frequency cells. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

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

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

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 38.304 within $K_{carrier} * T_{evaluate,NR_Inter}$ when $T_{reselection} = 0$ as specified in table 4.2.2.4-1 provided that the reselection criteria is met by

- the condition when performing equal priority reselection and

when rangeToBestCell is not configured:

- the cell is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 or.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them
 - -- the cell is at least 5dB better ranked in FR1 or [6.5]dB better ranked in FR2 if the current serving cell is among them. or
- 6dB in FR1 or 7.5dB in FR2 for SS-RSRP reselections based on absolute priorities or
- 4dB in FR1 or 4dB in FR2 for SS-RSRQ reselections based on absolute priorities.

When evaluating cells for reselection, the SSB side conditions apply to both serving and inter-frequency cells.

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

length.

The UE is not expected to meet the measurement requirements for an inter-frequency carrier under DRX cycle=320 ms defined in Table 4.2.2.4-1 under the following conditions:

- T_{SMTC_intra} = T_{SMTC_inter} = 160 ms; where T_{SMTC_intra} and T_{SMTC_inter} are periodicities of the SMTC occasions configured for the intra-frequency carrier and the inter-frequency carrier respectively, and
- SMTC occasions configured for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the SMTC occasions configured for the intra-frequency carrier, and
- SMTC occasions configured for the intra-frequency carrier and for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the paging occasion [1].

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

Table 4.2.2.4-1: T_{detect,NR_Inter}, T_{measure,NR_Inter} and T_{evaluate,NR_Inter}

4.2.2.5 Measurements of inter-RAT E-UTRAN cells

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

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

The requirements in this clause apply for inter-RAT E-UTRAN FDD measurements and E-UTRA TDD measurements. When the measurement rules indicate that inter-RAT E-UTRAN cells are to be measured, the UE shall measure RSRP and RSRQ of detected E-UTRA cells in the neighbour frequency list at the minimum measurement rate specified in this clause. The parameter $N_{EUTRA_carrier}$ is the total number of configured E-UTRA carriers in the neighbour frequency list. The UE shall filter RSRP and RSRQ measurements of each measured E-UTRA cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN}/2$.

An inter-RAT E-UTRA cell is considered to be detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band.
- SCH conditions specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band

The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 within ($N_{EUTRA_carrier}$) * $T_{detect,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchP}$ when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

Cells which have been detected shall be measured at least every ($N_{EUTRA_carrier}$) * $T_{measure,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,EUTRAN}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the

minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

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

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

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304 [1] within ($N_{EUTRA_carrier}$) * $T_{evaluate,EUTRAN}$ when $T_{reselection} = 0$ as speficied in table 4.2.2.5-1 provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-RAT E-UTRA cell is satisfied with the reselection criteria which are defined in TS 38.304 [1], the UE shall evaluate this E-UTRA cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

DRX cycle length [s]	T _{detect,EUTRAN} [s] (number of DRX cycles)	Tmeasure,EUTRAN [S] (number of DRX cycles)	T _{evaluate,EUTRAN} [s] (number of DRX cycles)
0.32	11.52 (36)	1.28 (4)	5.12 (16)
0.64	17.92 (28)	1.28 (2)	5.12 (8)
1.28	32(25)	1.28 (1)	6.4 (5)
2.56	58.88 (23)	2.56 (1)	7.68 (3)

Table 4.2.2.5-1: T_{detect,EUTRAN}, T_{measure,EUTRAN}, and T_{evaluate,EUTRAN}

4.2.2.6 Maximum interruption in paging reception

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI-NR} + 2*T_{target_cell_SMTC_period}$ ms.

At inter-RAT cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels for paging reception of the target inter-RAT cell. For NR to E-UTRAN cell re-selection the interruption time must not exceed $T_{SI-EUTRA} + 55$ ms.

 T_{SI-NR} is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for an NR cell.

T_{SI-EUTRA} is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [16] for an E-UTRAN cell.

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

4.2.2.7 General requirements

The UE shall search every layer of higher priority at least every $T_{higher_priority_search} = (60 * N_{layers})$ seconds, where N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information.

5 SA: RRC_INACTIVE state mobility

5.1 Cell Re-selection

5.1.1 Introduction

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

When the UE is in *Camped Normally* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS38.304, allowing the UE to limit its measurement activity.

5.1.2 Requirements

5.1.2.1 UE measurement capability

The requirements in sub-clause 4.2.2.1 shall apply.

5.1.2.2 Measurement and evaluation of serving cell

The requirements in sub-clause 4.2.2.2 shall apply.

5.1.2.3 Measurements of intra-frequency NR cells

The requirements in sub-clause 4.2.2.3 shall apply.

5.1.2.4 Measurements of inter-frequency NR cells

The requirements in sub-clause 4.2.2.4 shall apply.

5.1.2.5 Measurements of inter-RAT E-UTRAN cells

The requirements in sub-clause 4.2.2.5 shall apply.

5.1.2.6 Maximum interruption in paging reception

The requirements in sub-clause 4.2.2.6 shall apply.

5.1.2.7 General requirements

The requirements in sub-clause 4.2.2.7 shall apply.

5.2 Void

6 RRC_CONNECTED state mobility

6.1 Handover

6.1.1 NR Handover

6.1.1.1 Introduction

The purpose of NR handover is to change the NR PCell to another NR cell. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.1.2 NR FR1 - NR FR1 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR1 cell to NR FR1 cell.

6.1.1.2.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

6.1.1.2.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} \ + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown intrafrequency cell and the target cell Es/Iot \geq [-2] dB, then $T_{search} = T_{rs}$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geq [-2] dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

 $T_{\text{processing}}$ is time for UE processing. $T_{\text{processing}}$ can be up to 20ms.

 T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cellin the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell..

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.3 NR FR2- NR FR1 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR2 cell to NR FR1 cell.

6.1.1.3.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.3.2.

6.1.1.3.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than Tinterrupt

$$T_{interrupt} \equiv T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geq [-2] dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

 $T_{\text{processing}}$ is time for UE processing. $T_{\text{processing}}$ can be up to 40ms.

 T_{margin} is time for SSB post-processing. $T_{\text{margin}} \, \text{can}$ be up to 2ms.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.4 NR FR2- NR FR2 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR2 cell to NR FR2 cell.

6.1.1.4.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.4.2.

6.1.1.4.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell $Es/Iot \ge [-2]$ dB, then $T_{search} = 8*T_{rs}$ ms. If the target cell is an unknown inter-frequency cell and the target cell $Es/Iot \ge [-2]$ dB, then $T_{search} = 8*3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

T_{processing} is time for UE processing. T_{processing} can be up to 20ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = 1*T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In FR2, the target cell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the handover command:

- the UE has sent a valid measurement report for the target cell and
- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.1.5 NR FR1- NR FR2 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR1 cell to NR FR2 cell.

6.1.1.5.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.5.2.

6.1.1.5.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. . If the target cell is an unknown inter-frequency cell and the target cell $Es/Iot \ge [-2]$ dB, then $T_{search} = 8*3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

T_{processing} is time for UE processing. T_{processing} can be up 40ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = 1*T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In FR2, the target cell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the handover command:

- the UE has sent a valid measurement report for the target cell and
- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.2 NR Handover to other RATs

6.1.2.1 NR – E-UTRAN Handover

6.1.2.1.1 Introduction

The purpose of inter-RAT handover from NR to E-UTRAN is to change the radio access mode of PCell from NR to E-UTRAN. The handover procedure is initiated from NR with a RRC message that implies a handover as described in TS 38.331 [2]. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.2.1.2 Handover delay

When the UE receives a RRC message implying handover to E-UTRAN the UE shall be ready to start the transmission of the uplink PRACH channel in E-UTRA within $D_{handover}$ msec from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interrupt}$$

Where:

T_{RRC procedure delay}: it is the RRC procedure delay, which is 50ms

 $T_{interrupt}$: it is the time between end of the last TTI containing the RRC command on the NR PDSCH and the time the UE starts transmission of the PRACH in E-UTRAN, excluding $T_{RRC_procedure_delay}$. $T_{interrupt}$ is defined in clause 6.1.2.1.3.

6.1.2.1.3 Interruption time

When the inter-RAT handover to E-UTRAN is commanded, the interruption time shall be less than Tinterrupt

$$T_{interrupt} = T_{search} + T_{IU} + 20 \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search} = 80$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to 30 ms.

NOTE: The actual value of T_{IU} shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant E-UTRAN cell identification requirements are described in clause [9.4.1].

6.2 RRC Connection Mobility Control

6.2.1 SA: RRC Re-establishment

6.2.1.1 Introduction

This clause contains requirements on the UE regarding RRC connection re-establishment procedure. RRC connection re-establishment is initiated when a UE in RRC_CONNECTED state loses RRC connection due to any of failure cases, including radio link failure, handover failure, and RRC connection reconfiguration failure. The RRC connection re-establishment procedure is specified in clause 5.3.7 of TS 38.331 [2].

The requirements in this clause are applicable for RRC connection re-establishment to NR cell.

6.2.1.2 Requirements

In RRC_CONNECTED state the UE shall be capable of sending RRCReestablishmentRequest message within $T_{re-establish_delay}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re-establish_delay}$) shall be less than:

$$T_{re-establish\ delay} = T_{UE\ re-establish\ delay} + T_{UL\ grant}$$

T_{UL_grant}: It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit *RRCReestablishmentRequest* message.

The UE re-establishment delay (T_{UE_re-establish_delay}) is specified in clause 6.2.1.2.1.

6.2.1.2.1 UE Re-establishment delay requirement

The UE re-establishment delay ($T_{UE_re-establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the target PCell. The UE re-establishment delay ($T_{UE_re-establish_delay}$) requirement shall be less than:

$$T_{UE_re_establish_delay} = 50 \; \text{ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{N_{freq}-1} T_{identify_inter_NR,i} + T_{SI_NR} + T_{PRACH}$$

The intra-frequency target NR cell shall be considered detectable if each relevant SSB can satisfy that:

- SS-RSRP related side conditions given in clause 10.1.2 and 10.1.3 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR Band are fulfilled.

The inter-frequency target NR cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clause 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding NR Band are fulfilled.

 $T_{identify_intra_NR}$: It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. If the UE is not configured with intra-frequency NR carrier for RRC re-establishment then $T_{identify_intra_NR}$ =0; otherwise $T_{identify_intra_NR}$ shall not exceed the values defined in Table 6.2.1.2.1-1.

 $T_{identify_inter_NR,i}$: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the frequency range (FR) of the target NR cell. $T_{identify_inter_NR,i}$ shall not exceed the values defined in Table 6.2.1.2.1-2.

 T_{SMTC} : It is the periodicity of the SMTC occasion configured for the intra-frequency carrier. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*, T_{smtc} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

 $T_{SMTC,i}$: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*. If it is not configured, the UE may assume that the target SSB periodicity is no larger than 20 ms.

T_{SI-NR}: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for the target NR cell.

 T_{PRACH} : It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{PRACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 N_{freq} : It is the total number of NR frequencies to be monitored for RRC re-establishment; $N_{\text{freq}} = 1$ if the target intrafrequency NR cell is known, else $N_{\text{freq}} = 2$ and $T_{\text{identify_intra_NR}} = 0$ if the target inter-frequency NR cell is known.

There is no requirement if the target cell does not contain the UE context.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

Table 6.2.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intrafrequency cell

Serving cell	Frequency range	Tidentify_intra_NR [ms]		
SSB Ês/lot (dB)	(FR) of target NR cell	Known NR cell	Unknown NR cell	
≥ -8	FR1	MAX (200 ms, 5 x T _{SMTC})	MAX (800 ms, 10 x T _{SMTC})	
≥ -8	FR2	N/A	MAX (1000 ms, 80 x T _{SMTC}))	
< -8	FR1	N/A	800 ^{Note1}	
< -8	FR2	N/A	3520 ^{Note1}	

Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when $T_{\text{SMTC}} > 20$ ms and serving cell SSB \hat{E} s/lot < -8 dB.

Table 6.2.1.2.1-2: Time to identify target NR cell for RRC connection re-establishment to NR interfrequency cell

Serving cell SSB	Frequency range	Tidentify_inter_NR, i [ms]		
Ês/lot (dB)	(FR) of target NR cell	Known NR cell	Unknown NR cell	
≥ -8	FR1	MAX (200 ms, 6 x T _{SMTC, i})	MAX (800 ms, 13 x T _{SMTC, i})	
≥ -8	FR2	N/A	MAX (1000 ms, 104 x T _{SMTC, i}))	
< -8	FR1	N/A	800 ^{Note1}	
< -8	FR2	N/A	4000 ^{Note1}	

Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when $T_{SMTC,i} > 20$ ms and serving cell SSB \hat{E} s/lot < -8 dB.

6.2.2 Random access

6.2.2.1 Introduction

This clause contains requirements on the UE regarding random access procedure. The random access procedure is initiated to establish uplink time synchronization for a UE which either has not acquired or has lost its uplink synchronization, or to convey UE's request Other SI, or for beam failure recovery. The random access is specified in clause 8 of TS 38.213 [3] and the control of the RACH transmission is specified in clause 5.1 of TS 38.321 [7].

6.2.2.2 Requirements

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula defined in TS 38.213 [3] and apply this power level at the first preamble or additional preambles. The absolute power applied to the first preamble shall have an accuracy as specified in Table 6.3.4.2-1 of TS 38.101-1 [18] for frequency range 1 and in Table 6.3.4.2-1 of TS 38.101-2 [19] for frequency range 2. The relative power applied to additional preambles shall have an accuracy as specified in Table 6.3.4.3-1 of TS 38.101-1 [18] for frequency range 1 and clause 6.3.4.3 of TS38.101-2 [19] for frequency range 2.

The UE shall indicate a Random Access problem to upper layers if the maximum number of preamble transmission counter has been reached for the random access procedure on PCell or PSCell as specified in clause 5.1.4 in TS 38.321 [7].

The requirements in this clause apply for UE in SA operation mode or any MR-DC operation mode.

6.2.2.2.1 Contention based random access

6.2.2.2.1.1 Correct behaviour when transmitting Random Access Preamble

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB

if the association between Random Access Preambles and SS blocks is configured, as specified in clause 5.1.2 in TS 38.321 [7].

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, if the association between PRACH occasions and SSBs is configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.1.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.1.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.1.4 Correct behaviour when receiving an UL grant for msg3 retransmission

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

6.2.2.2.1.5 SA: Correct behaviour when receiving a message over Temporary C-RNTI

The UE shall send ACK if the Contention Resolution is successful.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

6.2.2.2.1.6 Correct behaviour when contention Resolution timer expires

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

6.2.2.2.2 Non-Contention based random access

6.2.2.2.2.1 Correct behaviour when transmitting Random Access Preamble

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs is configured, with the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *cfra-csirs-DedicatedRACH-Threshold* amongst the associated CSI-RSs, UE shall have the capability to select the Random Access Preamble corresponding to the selected CSI-RS, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal

probability amongst the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the random access procedure is initialized for beam failure recovery and if the contention-free Random Access Resources and the contention-free PRACH occasions for beam failure recovery request associated with any of the SSBs and/or CSI-RSs is configured, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs or the selected CSI-RS with CSI-RSRP above *cfra-csirs-DedicatedRACH-Threshold* amongst the associated CSI-RSs, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, or from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions or the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.2.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s), if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble, unless the random access procedure is initialized for Other SI request from UE.

The UE may stop monitoring for Random Access Response(s) and shall monitor the Other SI transmission if the Random Access Response only contains a Random Access Preamble identifier which is corresponding to the transmitted Random Access Preamble and the random access procedure is initialized for SI request from UE, as specified in clause 5.1.4 in TS 38.321 [7].

The UE may stop monitoring for Random Access Response(s), if the contention-free Random Access Preamble for beam failure recovery request was transmitted and if the PDCCH addressed to UE's C-RNTI is received, as specified in clause 5.1.4 in TS 38.321 [7].

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.2.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power, if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon* or if no PDCCH addressed to UE's C-RNTI is received within the RA Response window configured in *BeamFailureRecoveryConfig*, as defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.3 UE behaviour when configured with supplementary UL

In addition to the requirements defined in clause 6.2.2.2.1 and 6.2.2.2.2, a UE configured with supplementary UL carrier shall use RACH configuration for the supplementary UL carrier contained in RMSI and RRC dedicated signalling. If the cell for the random access procedure is configured with supplementary UL, the UE shall transmit or retransmit PRACH preamble on the supplementary UL carrier if the SS-RSRP measured by the UE on the DL carrier is lower than the *rsrp-ThresholdSSB-SUL* as defined in TS 38.331 [2].

6.2.3 SA: RRC Connection Release with Redirection

6.2.3.1 Introduction

This clause contains requirements on the UE regarding RRC connection release with redirection procedure. RRC connection release with redirection is initiated by the *RRCRelease* message with redirection to E-UTRAN or NR from NR specified in TS 38.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 of TS 38.331 [2].

6.2.3.2 Requirements

6.2.3.2.1 RRC connection release with redirection to NR

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell within $T_{connection_release_redirect_NR}$.

The time delay ($T_{connection_release_redirect_NR}$) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the NR PDSCH and the time the UE starts to send random access to the target NR cell. The time delay ($T_{connection_release_redirect_NR}$) shall be less than:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH}$$

The target NR cell shall be considered detetable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.5 for a corresponding NR Band are fulfilled.

T_{RRC_procedure_delay}: It is the RRC procedure delay for processing the received message "*RRCRelease*" as defined in clause 6.2.2 of TS 38.331 [2].

 $T_{identify-NR}$: It is the time to identify the target NR cell and depends on the frequency range (FR) of the target NR cell. It is defined in Table 6.2.3.2.1-1. Note that $T_{identify-NR} = T_{PSS/SSS-sync} + T_{meas}$, in which $T_{PSS/SSS-sync}$ is the cell search time and T_{meas} is the measurement time due to cell selection criteria evaluation.

 T_{SI-NR} : It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

T_{RACH}: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{RACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise T_{rs} is the SMTC periodicity configured in the measObjectNR having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with $T_{rs} = 20$ ms if the SSB transmission periodicity is not larger than 20 ms; otherwise,
- there is no requirement if the SSB transmission periodicity is larger than 20ms.

Table 6.2.3.2.1-1: Time to identify target NR cell for RRC connection release with redirection to NR

Frequency range (FR) of target NR cell		Tidentify-NR
FR1		MAX (680 ms, 11 x T _{rs})
FR2		MAX (880 ms, 8x11 x T _{rs})
Note:	If the UE has been provided with h	nigher layer signaling of smtc2 specified in TS 38.331 [2] prior to the
	redirection command, Trs follows	smtc1 or smtc2 according to the physical cell ID of the target cell.

6.2.3.2.2 RRC connection release with redirection to E-UTRAN

The UE shall be capable of performing the RRC connection release with redirection to the target E-UTRAN cell within $T_{\text{connection release redirect E-UTRA}$.

The time delay ($T_{connection_release_redirect_E-UTRA}$) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the PDSCH and the time the UE starts to send random access to the target E-UTRA cell. The time delay ($T_{connection_release_redirect_E-UTRA}$) shall be less than:

$$T_{connection_release_redirect_E-UTRA} = T_{RRC_procedure_delay} + T_{identify-E-UTRA} + T_{SI-E-UTRA} + T_{RACH}$$

The target E-UTRA FDD or TDD cell shall be considered detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- SCH conditions specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band.

 $T_{RRC_procedure_delay}$: It is the RRC procedure delay for processing the received message "RRCRelease" as defined in clause 6.2.2 of TS 38.331 [2].

T_{identify-E-UTRA}: It is the time to identify the target E-UTRA cell. It shall be less than 320 ms.

 $T_{SI\text{-}E\text{-}UTRA}$: It is the time required for acquiring all the relevant system information of the target E-UTRA cell. This time depends upon whether the UE is provided with the relevant system information (SI) of the target E-UTRA cell or not by the old NR cell before the RRC connection is released.

 T_{RACH} : It is the delay caused due to the random access procedure when sending random access to the target E-UTRA cell.

7 Timing

7.1 UE transmit timing

7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the reference cell in connected state. The uplink frame transmission takes place $(N_{TA} + N_{TA}) \times T_c$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. For serving cell(s) in PTAG, UE shall use the SpCell as the reference cell for deriving the UE transmit timing for cells in the PTAG. For serving cell(s) in STAG, UE shall use any of the activated SCells as the reference cell for deriving the UE transmit timing for the cells in the STAG. UE initial transmit timing accuracy, gradual timing adjustment requirements and one shot timing adjustment requirements are defined in the following requirements.

7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value T_e is specified in Table 7.1.2-1. This requirement applies:

- when it is the first transmission in a DRX cycle for PUCCH, PUSCH and SRS or it is the PRACH transmission.

The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus $(N_{\rm TA} + N_{\rm TA~offset}) \times T_{\rm c}$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the reference cell. $N_{\rm TA}$ for PRACH is defined as 0.

 $(N_{\rm TA} + N_{\rm TA~offset}) \times T_c$ (in T_c units) for other channels is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in clause 7.3 was applied. $N_{\rm TA}$ for other channels is not changed until next timing advance is received. The value of $N_{\rm TA~offset}$ depends on the duplex mode of the cell in which the uplink transmission takes place and the frequency range (FR). $N_{\rm TA~offset}$ is defined in Table 7.1.2-2.

3*64*Tc

Note 1:

SCS of SSB SCS of uplink Frequency Te Range signals (kHz) signals (kHz) 12*64*Tc 15 30 10*64*T_c 15 60 10*64*Tc 1 15 8*64*Tc 8*64*Tc 30 30 7*64*Tc 60 60 3.5*64*T_c 120 3.5*64*T_c 120 2 3*64*Tc 60

Table 7.1.2-1: Te Timing Error Limit

Table 7.1.2-2: The Value of $N_{\rm TA~offset}$

T_c is the basic timing unit defined in TS 38.211 [6]

120

240

Freque	ncy range and band of cell used for uplink transmission	N _{TA offset} (Unit: Tc)		
FR1 FD) band without LTE-NR coexistence case or	25600 (Note 1)		
FR1 TDD band without LTE-NR coexistence case				
FR1 FD	band with LTE-NR coexistence case	0 (Note 1)		
FR1 TD	band with LTE-NR coexistence case	39936 (Note 1)		
FR2		13792		
Note 1: The UE identifies $N_{ m TA~offset}$ based on the information n-				
TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided				

TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of $N_{\rm TA~offset}$ is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] and the value 39936 of $N_{\rm TA~offset}$ can also be provided for a FDD serving cell.

Note 2: Void

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell except when the timing advance in clause 7.3 is applied.

Table 7.1.2-3: void

7.1.2.1 Gradual timing adjustment

When the transmission timing error between the UE and the reference timing exceeds $\pm T_e$ then the UE is required to adjust its timing to within $\pm T_e$. The reference timing shall be $(N_{TA} + N_{TA \text{ offset}}) \times T_c$ before the downlink timing of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:

- 1) The maximum amount of the magnitude of the timing change in one adjustment shall be T_q.
- 2) The minimum aggregate adjustment rate shall be T_p per second.
- 3) The maximum aggregate adjustment rate shall be T_q per 200 ms.

where the maximum autonomous time adjustment step T_q and the aggregate adjustment rate T_p are specified in Table 7.1.2.1-1.

Table 7.1.2.1-1: T_q Maximum Autonomous Time Adjustment Step and T_p Minimum Aggregate Adjustment rate

Frequency Range	SCS of uplink signals (kHz)	Tq	Тр	
	15	5.5*64*T _c	5.5*64*Tc	
1	30	5.5*64*T _c	5.5*64*Tc	
	60	5.5*64*T _c	5.5*64*Tc	
2	60	2.5*64*T _c	2.5*64*Tc	
2	120	2.5*64*T _c	2.5*64*T _c	
NOTE: T _c is the basic timing unit defined in TS 38.211 [6]				

7.1.2.2 Void

Table 7.1.2.2-1: Void

7.2 UE timer accuracy

7.2.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

7.2.2 Requirements

For UE timers specified in TS 38.331 [2], the UE shall comply with the timer accuracies according to Table 7.2.2-1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. slot alignment when UE sends messages at timer expiry).

Table 7.2.2-1

Timer value [s]	Accuracy
timer value < 4	± 0.1s
timer value > 4	+ 2 5%

7.3 Timing advance

7.3.1 Introduction

The timing advance is initiated from gNB to UE in EN-DC, NR-DC, NE-DC and NR SA operation modes,, with MAC message that implies and adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [7].

7.3.2 Requirements

7.3.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot n+k+1 for a timing advance command received in time slot n, and the value of k is defined in clause 4.2 in TS 38.213 [3]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

7.3.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to the UE Timing Advance adjustment accuracy requirement in Table 7.3.2.2-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS 38.213 [3].

Table 7.3.2.2-1: UE Timing Advance adjustment accuracy

UL Sub Carrier Spacing(kHz)	15	30	60	120
UE Timing Advance adjustment accuracy	±256 T _c	±256 T _c	±128 T _c	±32 T _c

7.4 Cell phase synchronization accuracy

7.4.1 Definition

Cell phase synchronization accuracy for TDD is defined as the maximum absolute deviation in frame start timing between any pair of cells on the same frequency that have overlapping coverage areas.

7.4.2 Minimum requirements

The cell phase synchronization accuracy measured at BS antenna connectors shall be better than 3 µs.

7.5 Maximum Transmission Timing Difference

7.5.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundary of E-UTRA PCell and the closest slot timing boundary of PSCell to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative transmission timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundary of PCell and subframe timing boundary of E-UTRA PSCell to be aggregated for NE-DC operation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundaries of PCell and the closest slot timing boundary of PSCell to be aggregated in NR DC operation.

7.5.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1.

Table 7.5.2-1 Maximum uplink transmission timing difference requirement for asynchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	500
15	30	250
15	60	125
15	120 ^{Note1}	62.5

NOTE 1: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.5.3 and this Table 7.5.2-1 is also applicable, the scenario with 120kHz PSCell does not exist.

Table 7.5.2-2 Void

7.5.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell for inter-band synchronous EN-DC as shown in Table 7.5.2.1-1 1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.5.2.1-1 Maximum uplink transmission timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing in E- UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	35.21
15	30	35.21
15	60	35.21
15	120	35.21

7.5.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.3-1 for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.5.3-1: Maximum uplink transmission timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (μs)
15	15	5.21 ^{Note1,Note 2}
15	30	5.21 ^{Note 2}
15	60	5.21 Note 2

NOTE 1: This is not applicable for a UE which indicates the capability of only supporting single UL timing (*ul-TimingAlignmentEUTRA-NR* is signalled). Single UL timing for E-UTRA and NR cell is assumed for this UE.

NOTE 2: If the transmission timing difference exceeds the cyclic prefix length of the UL Sub-carrier spacing for data in PSCell, NR UE Tx EVM degradation is expected for the symbol that is overlapping the LTE subframe boundary

7.5.4 Minimum Requirements for NR Carrier Aggregation

The UE shall be capable of handling at least a relative transmission timing difference between slot timing of all pairs of TAGs as shown in Table 7.5.4-1, provided that the UE is:

- configured with the pTAG and the sTAG for inter-band NR carrier aggregation in SA or NR-DC mode, or
- configured with more than one sTAG for inter-band NR carrier aggregation in EN-DC or NE-DC mode.

Table 7.5.4-1: Maximum uplink transmission timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of TAGs	Maximum uplink transmission timing difference (μs)
FR1	34.6
FR2	8.5
Between FR1 and FR2	26.1

7.5.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell as shown in Table 7.5.5-1 for inter-band asynchronous NE-DC.

Table 7.5.5-1: Maximum uplink transmission timing difference requirement for inter-band asynchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: Void		

Table 7.5.5-2: Void

7.5.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell for inter-band synchronous NE-DC as shown in Table 7.5.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.5.5.1-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	35.21
30	15	35.21
60	15	35.21
120	15	35.21

7.5.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell as shown in Table 7.5.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.5.6-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum uplink transmission
PCell	PSCell	timing difference (µs)
FR1	FR2	34.1

7.6 Maximum Receive Timing Difference

7.6.1 Introduction

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of a E-UTRA cell belonging to the MCG and the closest slot timing boundary of a cell belonging to SCG to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of a E-UTRA cell belonging to the SCG to be aggregated for NE-DC operation and the closest slot timing boundary of a cell belonging to MCG.

A UE shall be capable of handling a relative receive timing difference between slot timing boundary of a cell belonging to MCG and the closest slot timing boundary of a cell belonging to the SCG to be aggregated for NR DC operation. A UE shall be capable of handling a relative receive timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

7.6.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver as shown in Table 7.6.2-1.

Table 7.6.2-1: Maximum receive timing difference requirement for asynchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note 1)	Maximum receive timing difference (µs)
15	15	500
15	30	250
15	60	125
15	120 ^{Note2}	62.5
NOTE 1: DI Sub-carrier spacing is min/SCScc SCSpata		

NOTE 1: DL Sub-carrier spacing is min{SCS_{SS}, SCS_{DATA}}.

NOTE 2: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.6.3 and this Table 7.6.2-1 is also applicable, the scenario with 120 kHz does not exit.

Table 7.6.2-2: Void

Table 7.6.2-3 Void

7.6.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver for inter-band synchronous EN-DC as shown in Table 7.6.2.1-1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.6.2.1-1: Maximum receive timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCGPCell (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note1)	Maximum receive timing difference (µs)
15	15	
15	30	33
15	60	33
15	120	
Note 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		

7.6.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.3-1 for E-UTRA FDD-NR FDD and E-UTRA TDD-NR TDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.6.3-1 Maximum receive timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) ^{Note1}	Maximum receive timing difference (μs)
15	15	3
15	30	3
15	60	3
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		

Table 7.6.3-2 Void

7.6.4 Minimum Requirements for NR Carrier Aggregation

For intra-band CA, only co-located deployment is applied. For intra-band non-contiguous NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of different carriers to be aggregated at the UE receiver as shown in Table 7.6.4-1 below.

Table 7.6.4-1: Maximum receive timing difference requirement for intra-band non-contiguous NR carrier aggregation

Frequ	ency Range	Maximum receive timing difference (µs)
FR1		3 ¹
FR2		0.26
Note 1:	receive time differength of that SC	fferent SCS on different CCs, if the erence exceeds the cyclic prefix CS, demodulation performance xpected for the first symbol of the

For inter-band NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of all pairs of carriers to be aggregated at the UE receiver as shown in Table 7.6.4-2 below.

Table 7.6.4-2: Maximum receive timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of carriers	Maximum receive timing difference (µs)
FR1	33
FR2	8
Between FR1 and FR2	25

7.6.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for asynchronous NE-DC as shown in Table 7.6.5-1.

Table 7.6.5-1: Maximum receive timing difference requirement for asynchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note 1)	Maximum receive timing difference (µs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }. NOTE 2: Void		

Table 7.6.5-2: Void

7.6.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.6.5.1-1: Maximum receive timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note1)	Maximum receive timing difference (μs)
15	15	
30	15	33
60	15	
120	15	

7.6.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG at the UE receiver as shown in Table 7.6.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.6.6-1: Maximum receive timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum receive timing	
Cell in	Cell in	difference (µs)	
MCG	SCG		
FR1	FR2	33	

7.7 deriveSSB-IndexFromCell tolerance

7.7.1 Minimum requirements

When *deriveSSB-IndexFromCell* is enabled, the UE assumes frame boundary alignment (including half frame, subframe and slot boundary alignment) across cells on the same frequency carrier is within a tolerance not worse than min(2 SSB symbols, 1 PDSCH symbol) and the SFNs of all cells on the same frequency carrier are the same.

7.8 Void

8 Signalling characteristics

8.1 Radio Link Monitoring

8.1.1 Introduction

The requirements in clause 8.1 apply for radio link monitoring on:

- PCell in SA NR, NR-DC and NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The UE shall monitor the downlink radio link quality based on the reference signal configured as RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [3]. The configured RLM-RS resources can be all SSBs, or all CSI-RSs, or a mix of SSBs and CSI-RSs. UE is not required to perform RLM outside the active DL BWP.

On each RLM-RS resource, the UE shall estimate the downlink radio link quality and compare it to the thresholds Q_{out} and Q_{in} for the purpose of monitoring downlink radio link quality of the cell.

The threshold Q_{out} is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLER_{out}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{out_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-1. For CSI-RS based radio link monitoring, Q_{out_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-1.

The threshold Q_{in} is defined as the level at which the downlink radio link quality can be received with significantly higher reliability than at Q_{out} and shall correspond to the in-sync block error rate (BLER_{in}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{in_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-2. For CSI-RS based radio link monitoring, Q_{in_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-2.

The out-of-sync block error rate (BLER_{out}) and in-sync block error rate (BLER_{in}) are determined from the network configuration via parameter *rlmInSyncOutOfSyncThreshold* signalled by higher layers. When UE is not configured with *rlmInSyncOutOfSyncThreshold* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 8.1.1-1 by default. All requirements in clause 8.1 are applicable for BLER Configuration #0 in Table 8.1.1-1.

Table 8.1.1-1: Out-of-sync and in-sync block error rates

Configuration	BLERout	BLERin
0	10%	2%

UE shall be able to monitor up to N_{RLM} RLM-RS resources of the same or different types in each corresponding carrier frequency range, depending on a maximum number L_{max} of candidate SSBs per half frame according to TS 38.213 [3], where N_{RLM} is specified in Table 8.1.1-2, and meet the requirements as specified in clause 8.1. UE is not required to meet the requirements in clause 8.1 if RLM-RS is not configured and no TCI state for PDCCH is activated.

Table 8.1.1-2: Maximum number of RLM-RS resources N_{RLM}

Carrier frequency range of PCell/PSCell	$L_{ m max}$	Maximum number of RLM-RS resources, N _{RLM}
FR1, ≤ 3 GHz ^{Note}	4	2
FR1, > 3 GHz ^{Note}	8	4
FR2	64	8
NOTE: For unpaired spectrum operation with Case C - 30 kHz SCS, 3GHz is replaced by 2.4GHz, as specified in clause 4.1 in TS 38.213 [3].		

8.1.2 Requirements for SSB based radio link monitoring

8.1.2.1 Introduction

The requirements in this clause apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.2.2.

Table 8.1.2.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0	
DCI format	1-0	
Number of control OFDM symbols	2	
Aggregation level (CCE)	8	
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB	
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB	
Bandwidth (PRBs)	24	
Sub-carrier spacing (kHz)	SCS of the active DL BWP	
DMRS precoder granularity	REG bundle size	
REG bundle size	6	
CP length	Normal	
Mapping from REG to CCE	Distributed	

Value for BLER Configuration #0 **Attribute** DCI payload size 1-0 Number of control OFDM 2 symbols Aggregation level (CCE) 4 Ratio of hypothetical PDCCH RE energy to average SSS 0dB RE energy Ratio of hypothetical PDCCH DMRS energy to average 0dB SSS RE energy Bandwidth (PRBs) 24 Sub-carrier spacing (kHz) SCS of the active DL BWP DMRS precoder granularity REG bundle size REG bundle size 6 CP length Normal Mapping from REG to CCE Distributed

Table 8.1.2.1-2: PDCCH transmission parameters for in-sync evaluation

8.1.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{Evaluate_out_SSB}$ [ms] period becomes worse than the threshold Q_{out_SSB} within $T_{Evaluate_out_SSB}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_SSB}}$ [ms] period becomes better than the threshold $Q_{\text{in_SSB}}$ within $T_{\text{Evaluate_in_SSB}}$ [ms] evaluation period.

T_{Evaluate out SSB} and T_{Evaluate in SSB} are defined in Table 8.1.2.2-1 for FR1.

T_{Evaluate out SSB} and T_{Evaluate in SSB} are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the SSB; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{sharing\ factor}$, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5 \times T_{SMTCperiod}$

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP,T_{SMTCperiod})}}, \text{ when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion (T_SSB < T_{SMTCperiod}) and SMTC occasion is$

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 1$
 - if all of the reference signals configured for RLM outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for RLM outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

If the high layer in TS 38.331 [2] signaling of *smtc2* is present, T_{SMTCperiod} follows *smtc2*; Otherwise T_{SMTCperiod} follows *smtc1*.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

 $\begin{array}{c|cccc} \textbf{Configuration} & \textbf{T}_{\textbf{Evaluate_out_SSB}} \ \textbf{(ms)} & \textbf{T}_{\textbf{Evaluate_in_SSB}} \ \textbf{(ms)} \\ & \text{no DRX} & \text{Max}(200, \text{Ceil}(10 \times P) \times \text{T}_{\text{SSB}}) & \text{Max}(100, \text{Ceil}(5 \times P) \times \text{T}_{\text{SSB}}) \\ & \text{DRX cycle} \leq 320 \text{ms} & \text{Max}(200, \text{Ceil}(15 \times P) \times & \text{Max}(100, \text{Ceil}(7.5 \times P) \times \text{Max}(\text{T}_{\text{DRX}}, \text{T}_{\text{SSB}})) \\ & \text{DRX cycle} > 320 \text{ms} & \text{Ceil}(10 \times P) \times \text{T}_{\text{DRX}} & \text{Ceil}(5 \times P) \times \text{T}_{\text{DRX}} \\ & \text{NOTE:} & \text{T}_{\text{SSB}} \ \text{is the periodicity of the SSB configured for RLM. T}_{\text{DRX}} \ \text{is the DRX cycle length.} \\ \end{array}$

Table 8.1.2.2-1: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR1

Table 8.1.2.2-2: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR2

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_} SSB (ms)
no DRX	Max(200, Ceil($10 \times P \times N$) $\times T_{SSB}$)	Max(100, Ceil($5 \times P \times N$) $\times T_{SSB}$)
DRX cycle≤320ms	Max(200, Ceil(15 \times P \times N) \times	$Max(100, Ceil(7.5 \times P \times N) \times Max(T_{DRX}, T_{SSB}))$
	$Max(T_{DRX},T_{SSB}))$	
DRX cycle>320ms	Ceil($10 \times P \times N$) $\times T_{DRX}$	Ceil(5 \times P \times N) \times T _{DRX}
NOTE: T _{SSB} is the periodicity of the SSB configured for RLM. T _{DRX} is the DRX cycle length.		

8.1.2.3 Measurement restrictions for SSB based RLM

The UE is required to be capable of measuring SSB for RLM without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for RLM is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for RLM without any restriction;
- If SSB and CSI-RS have different SCS,

- If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for RLM without any restriction;
- If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

For FR2, when the SSB for RLM measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

8.1.3 Requirements for CSI-RS based radio link monitoring

8.1.3.1 Introduction

The requirements in this clause apply for each CSI-RS based RLM-RS resource configured for PCell or PSCell, provided that the CSI-RS configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.3.2. UE is not expected to perform radio link monitoring measurements on the CSI-RS configured as RLM-RS if the CSI-RS is not in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.1.3.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0	
DCI format	1-0	
Number of control OFDM symbols	2	
Aggregation level (CCE)	8	
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	4dB	
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	4dB	
Bandwidth (PRBs)	48	
Sub-carrier spacing (kHz)	SCS of the active DL BWP	
DMRS precoder granularity	REG bundle size	
REG bundle size	6	
CP length	Normal	
Mapping from REG to CCE	Distributed	

Attribute	Value for BLER Configuration #0	
DCI payload size	1-0	
Number of control OFDM symbols	2	
Aggregation level (CCE)	4	
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	0dB	
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	0dB	
Bandwidth (PRBs)	48	
Sub-carrier spacing (kHz)	SCS of the active DL BWP	
DMRS precoder granularity	REG bundle size	
REG bundle size	6	
CP length	Normal	
Mapping from REG to CCE	Distributed	

Table 8.1.3.1-2: PDCCH transmission parameters for in-sync evaluation

8.1.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_out_CSI-RS}}$ [ms] period becomes worse than the threshold $Q_{\text{out_CSI-RS}}$ within $T_{\text{Evaluate_out_CSI-RS}}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_CSI-RS}}$ [ms] period becomes better than the threshold $Q_{\text{in_CSI-RS}}$ within $T_{\text{Evaluate_in_CSI-RS}}$ [ms] evaluation period.

- T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} are defined in Table 8.1.3.2-1 for FR1.
- T_{Evaluate out CSI-RS} and T_{Evaluate in CSI-RS} are defined in Table 8.1.3.2-2 for FR2 with scaling factor N=1.

The requirements of T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} apply provided that the CSI-RS for RLM is not in a resource set configured with repetition ON. The requirements do not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for RLM and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1.

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the CSI-RS; and
- P = 1, when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the RLM-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- P = 3, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).

- $P = \frac{1}{1 - \frac{T_{CSI-RS}}{MRGP} - \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRGP,T_{SMTCneriod})}},$ when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{3}{1 - \frac{T_{CSI-RS}}{MRGP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)

If the high layer in TS 38.331 [2] signaling of *smtc2* is present, T_{SMTCperiod} follows *smtc2*; Otherwise T_{SMTCperiod} follows *smtc1*.

Note: The overlap between CSI-RS for RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

The values of M_{out} and M_{in} used in Table 8.1.3.2-1 and Table 8.1.3.2-2 are defined as:

- $M_{out} = 20$ and $M_{in} = 10$, if the CSI-RS resource configured for RLM is transmitted with higher layer CSI-RS parameter *density* [6, clause 7.4.1] set to 3 and over the bandwidth ≥ 24 PRBs.

Table 8.1.3.2-1: Evaluation period T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} for FR1

Со	nfiguration	T _{Evaluate_out_CSI-RS} (ms)	T _{Evaluate_in_CSI-RS} (ms)
	no DRX	Max(200, Ceil(Mout×P)×Tcsl-Rs)	$Max(100, Ceil(M_{in} \times P) \times T_{CSI-RS})$
DR	X ≤ 320ms	Max(200, Ceil(1.5×Mout×P)×	Max(100, Ceil(1.5×Min×P)× Max(TDRX, TCSI-
		Max(T _{DRX} , T _{CSI-RS}))	RS))
DF	RX > 320ms	Ceil(Mout×P) x TDRX	$Ceil(M_{in} \times P) \times T_{DRX}$
NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table			
apply for T _{CSI-RS} equal to 5 ms, 10ms, 20 ms or 40 ms. T _{DRX} is the DRX cycle length.			

Table 8.1.3.2-2: Evaluation period Tevaluate_out_CSI-RS and Tevaluate_in_cSI-RS for FR2

	Configuration	T _{Evaluate_out_CSI-RS} (ms)	T _{Evaluate_in_} CSI-RS (ms)
	no DRX	Max(200, Ceil(M _{out} ×P×N)×T _{CSI-RS})	$Max(100, Ceil(M_{in} \times P \times N) \times T_{CSI-RS})$
	DRX ≤ 320ms	Max(200, Ceil(1.5×M _{out} ×P×N)×	Max(100, Ceil(1.5×M _{in} ×P×N)×
		Max(T _{DRX} , T _{CSI-RS}))	Max(T _{DRX} , T _{CSI-RS}))
	DRX > 320ms	$Ceil(M_{out} \times P \times N) \times T_{DRX}$	$Ceil(M_{in} \times P \times N) \times T_{DRX}$
NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table apply for			
T _{CSI-RS} equal to 5 ms, 10 ms, 20 ms or 40 ms. T _{DRX} is the DRX cycle length.			

8.1.3.3 Measurement restrictions for CSI-RS based RLM

The UE is required to be capable of measuring CSI-RS for RLM without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for RLM is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for RLM in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD, or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports simultaneousRxDataSSB-DiffNumerology the UE shall be able to perform CSI-RS for RLM measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR1, when the CSI-RS for RLM is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for RLM without any restriction.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for RLM and the other CSI-RS. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.
 - The CSI-RS for RLM or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for RLM without any restriction.

8.1.4 Minimum requirement at transitions

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each RLM-RS resource, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation period corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode for each RLM-RS resource. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of RLM resources to a second configuration of RLM resources that is different from the first configuration, for each RLM resource present in the second configuration, for a duration of time equal to the evaluation period corresponding to the second configuration after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first configuration and the second configuration. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second configuration for each RLM resource present in the second configuration. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for RLM present in the second configuration, the UE shall use an evaluation period corresponding to the second configuration from the time of transition. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

8.1.5 Minimum requirement for UE turning off the transmitter

The transmitter power of the UE in the monitored cell shall be turned off within 40ms after expiry of T310 timer as specified in TS 38.331 [2].

8.1.6 Minimum requirement for L1 indication

When the downlink radio link quality on all the configured RLM-RS resources is worse than Q_{out}, layer 1 of the UE shall send an out-of-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the out-of-sync indications as specified in TS 38.331 [2].

When the downlink radio link quality on at least one of the configured RLM-RS resources is better than Q_{in} , layer 1 of the UE shall send an in-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the in-sync indications as specified in TS 38.331 [2].

The out-of-sync and in-sync evaluations for the configured RLM-RS resources shall be performed as specified in clause 5 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication_interval}$.

When DRX is not used $T_{Indication_interval}$ is max(10ms, $T_{RLM-RS,M}$), where $T_{RLM,M}$ is the shortest periodicity of all configured RLM-RS resources for the monitored cell, which corresponds to T_{SSB} specified in clause 8.1.2 if the RLM-RS resource is SSB, or T_{CSI-RS} specified in clause 8.1.3 if the RLM-RS resource is CSI-RS.

In case DRX is used, $T_{Indication_interval}$ is Max(10ms, $1.5 \times DRX_cycle_length$, $1.5 \times T_{RLM-RS,M}$) if DRX cycle_length is less than or equal to 320ms, and $T_{Indication_interval}$ is DRX_cycle_length if DRX cycle_length is greater than 320ms. Upon start of T310 timer as specified in TS 38.331 [2], the UE shall monitor the configured RLM-RS resources for recovery using the evaluation period and layer 1 indication interval corresponding to the no DRX mode until the expiry or stop of T310 timer.

8.1.7 Scheduling availability of UE during radio link monitoring

When the reference signal to be measured for RLM has different subcarrier spacing than PDSCH/PDCCH or is on frequency range 2, there are restrictions on the scheduling availability as described in the following clauses.

8.1.7.1 Scheduling availability of UE performing radio link monitoring with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to radio link monitoring performed with a same subcarrier spacing as PDSCH/PDCCH on FR1.

8.1.7.2 Scheduling availability of UE performing radio link monitoring with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to radio link monitoring based on SSB as RLM -RS.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR1 is performed, the scheduling restrictions on FR1 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is performed, there are no scheduling restrictions on FR1 serving cell(s) in the bands due to radio link monitoring performed on FR1 serving PCell or PSCell in different bands.

8.1.7.3 Scheduling availability of UE performing radio link monitoring on FR2

The following scheduling restriction applies due to radio link monitoring on an FR2 serving PCell and/or PSCell.

- If the RLM-RS is CSI-RS which is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON,

- There are no scheduling restrictions due to radio link monitoring based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on RLM-RS symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for RLM; and

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for RLM.

8.1.7.4 Scheduling availability of UE performing radio link monitoring on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to radio link monitoring performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to radio link monitoring performed on FR1 serving PCell and/or PSCell.

Editor's Note: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

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8.2 Interruption

8.2.1 EN-DC Interruption

8.2.1.1 Introduction

This clause contains the requirements related to the interruptions on PSCell, and SCell, when

E-UTRA PCell transitions between active and non-active during DRX, or

E-UTRA PCell transitions from non-DRX to DRX, or

E-UTRA SCell in MCG or SCell in SCG is added or released, or

E-UTRA SCell in MCG or SCell in SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA MCG or NR SCG, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

UL/DL BWP is switched on PSCell or SCell in SCG.

The requirements shall apply for E-UTRA-NR DC with an E-UTRA PCell.

This clause contains interruptions where victim cell is PSCell or SCell belonging to SCG. Requirements for interruptions requirements when the victim cell is E-UTRA PCell or E-UTRA SCell belonging to MCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.1.2 Requirements

8.2.1.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions between active and non-active druing DRX when PSCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.1.2.1-1.

Table 8.2.1.2.1-1: Interruption length X at transition between active and non-active during DRX

//	NR Slot	Interruption length X (slots		
μ	length (ms)	Sync	Async	
0	1	1	2	
1	0.5	1	2	
2	0.25	3		
3	0.125	5		

When both E-UTRA PCell and PSCell are in DRX, no interruption is allowed.

8.2.1.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions from non-DRX to DRX when PSCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.1.2.1-1.

When PSCell and the activated SCell are in DRX, no interruption due to E-UTRA PCell transitions from non-DRX to DRX is allowed.

8.2.1.2.3 Interruptions at SCell addition/release

The requirements in this clause shall apply for the UE configured with PSCell.

When one E-UTRA SCell in MCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the E-UTRA SCells being added or released, or
 - of up to max{Y1 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA SCells being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being added or released are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in SCG;

Where X1 and Y1 are specified in Table 8.2.1.2.3-1.

When one SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the SCells being added or released, or

- of up to Y1 slot + T_{SMTC_duration} if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot, where, T_{SMTC_duration} is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being added when one SCell is added;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.1.2.3-2.

Table 8.2.1.2.3-1: Interruption length X1 and Y1 at E-UTRA SCell addition/Release

μ	NR Slot length	Interruption length X1 (slots)		Interruption le	ngth Y1 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3
2	0.25		5	4	5
3	0.125		9	N/A	N/A

Table 8.2.1.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and victim cell are on FR2	4	4
		Either aggressor cell or victim cell is on FR1		
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.1.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with PSCell and one SCell.

When one E-UTRA SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the E-UTRA SCells being activated or deactivated, or
 - of up to max{Y2 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being activated or deactivated are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in SCG.

Where X2 and Y2 are specified in Table 8.2.1.2.4-1.

When one SCell in SCG is activated or deactivated:

- an interruption on any serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or

- of up to Y2 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being activated when one SCell is activated;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.1.2.4-2.

Table 8.2.1.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

μ	NR Slot length	Interruption length X2 (slots)		Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125		5	N/A	N/A

Table 8.2.1.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption length X2 (slots)		Interruption length Y2 (slots)
0	1	1		1
1	0.5	1		1
2	0.25	Both aggressor cell and victim 2 cell are on FR2		2
		Either aggressor cell or victim cell is on FR1	3	
3	0.125	Aggressor cell is on FR2 4		4
		Aggressor cell is on FR1	5	

8.2.1.2.5 Interruptions during measurements on SCC

8.2.1.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PSCell and other activated NR SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3, where the term PCell in clause 8.2.2.2.3 shall be deemed to be replaced with PSCell.

8.2.1.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in MCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slot, if the PSCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slot + SMTC duration, if the PSCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PSCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Table 8.2.1.2.5.2-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length		n length X3 ots)	Interruption le	ngth Y3 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125		5	N/A	N/A

8.2.1.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR non-standalone operation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to X4 slot, is allowed during the RRC reconfiguration procedure [2] on E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.1.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length X4 (slots)	
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25	5	
3	0.125	9	

8.2.1.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay T_{BWPswitchDelay} as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay T_{BWPswitchDelay} as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in

Table 8.2.1.2.7-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.1.2.7-1: interruption length X

μ	NR Slot length (ms)	Interruption length X (slots ^{Note 1})		
0	1	1		
1	0.5	1		
2	0.25	3		
3	0.125	5		
Note1:	If the BWP switch involves changing of SCS, the interruption due to BWP switch is determined by the smaller SCS between the SCS before BWP switch and the SCS after the BWP switch.			

Table 8.2.1.2.7-2: Parameters which cause interruption other than SCS

Parameters	Comment		
locationAndBandwidth	From TS 38.331 [2]		
nrofSRS-Ports	F1011 13 36.331 [2]		
Editor's note: More parameters can be added if identified			

8.2.2 SA: Interruptions with Standalone NR Carrier Aggregation

8.2.2.1 Introduction

This clause contains the requirements related to the interruptions on PCell and activated SCell if configured, when

up to 7 SCells are configured, de-configured, activated or deactivated, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell or SCell.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

Editor's Note: The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command.

This clause additionally contains requirements related to interruptions at inter-frequency SFTD between PCell in FR1 and neighbour cell in FR2.

For a UE which does not support per-FR measurement gaps, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For UE which support per-FR gaps, interruptions to PCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.2.2 Requirements

8.2.2.2.1 Interruptions at SCell addition/release

When any number of SCells between one and 7 is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any active serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.1-1, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to the duration shown in table 8.2.2.2.1-2, if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot.

Table 8.2.2.2.1-1: Interruption duration for SCell addition/release for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)		
0	1		1	
1	0.5	2		
2	0.25	Both aggressor cell and victim cell are on FR2	4	
		Either aggressor cell or victim cell is on FR1	5	
3	0.125	Aggressor cell is on FR2 8		
		Aggressor cell is on FR1	9	

Table 8.2.2.2.1-2: Interruption duration for SCell addition/release for intra-band CA

Interruption length (slot)

NR Slot

μ	length (ms)	,			
0	1	1 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$			
1	0.5	2 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$			
2	0.25	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$			
3	0.125	8 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$			
NOTE 1: T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above active serving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.					
NOTE	2: N _{-1-t} subframe	^{,//} is as defined in TS 38,211 [6].			

8.2.2.2.2 Interruptions at SCell activation/deactivation

When an intra-band SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.2-1, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to the duration shown in table 8.2.2.2.2-2, if the active serving cells are in the same band as any of the SCells being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot.

Table 8.2.2.2.2-1: Interruption duration for SCell activation/deactivation for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)		
0	1		1	
1	0.5		1	
2	0.25	Both aggressor cell and victim cell are on FR2	2	
		Either aggressor cell or victim cell is on FR1	3	
3	0.125	Aggressor cell is on FR2	4	
		Aggressor cell is on FR1	5	

Table 8.2.2.2.2: Interruption duration for SCell activation/deactivation for intra-band CA

μ	NR Slot	Interruption length (slots)				
	length (ms)					
0	1	1 + T _{SMTC_duration} $*N_{ m slot}^{ m subframe}$, μ				
1	0.5	1 + T _{SMTC_duration} $*N_{ m slot}^{ m subframe}$, μ				
2	0.25	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$				
3	0.125	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$				
NOTE 1:	T _{SMTC_duration} meas	sured in subframes is				
	- the longest SMT	C duration among all above active				
	serving cells and	the SCell being activated when				
	one SCell is activa					
	- the longest SMTC duration among all active					
	· ·					
	serving cells in the same band when one SCell is					
	deactivated.					
NOTE 2:	$N_{\perp}^{\text{subframe},\mu}$ is as defined in TS 38.211 [6].					

8.2.2.2.3 Interruptions during measurements on deactivated SCC

Interruptions on PCell due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.1 if the PCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 8.2.2.2.2.2 if the PCell is in the same band as the deactivated SCell.

Interruptions on activated SCells due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.2-1 if the activated SCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 8.2.2.2.2-2 if the activated SCell is in the same band as the deactivated SCell.

8.2.2.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR standalone carrier aggregation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.2.2.4-1, is allowed during the RRC reconfiguration procedure [2] on PCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell and all the activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.2.2.4-1: Interruption duration for UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.2.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\text{BWPswitchDelay}}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\rm BWPswitchDelay}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.2.2.5-1: Interruption length X

NR Slot

Interruption length X

μ	length (ms)	(slots ^{Note 1})			
0	1	1			
1	0.5	1			
2	0.25	3			
3	0.125	5			
Note1:	If the BWP switch involves changing of SCS, the interruption due to BWP switch is determined by the smaller SCS between the SCS before BWP switch and the SCS after the BWP switch				

Table 8.2.2.2.5-2: Parameters which cause interruption other than SCS

Parameters	Comment			
locationAndBandwidth	From TC 20 224 [2]			
nrofSRS-Ports	From TS 38.331 [2]			
Editor's note: More parameters can be added if identified				

8.2.2.2.6 Interruptions at inter-frequency SFTD measurement

The requirements in this clause concern interruptions on PCell, as well as on activated SCells in MCG, when the UE is performing SFTD measurements on inter-frequency neighbour cell(s). The following requirements apply when no PSCell is configured.

For a UE with per-FR gap capability:

- for neighbour cell in FR1:
 - the percentage of interrupted slots on uplink and downlink on FR1 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR2 serving cells.
 - the length of each interruption on FR1 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.
- for neighbour cell in FR2:
 - the percentage of interrupted slots on uplink and downlink on FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR1 serving cells.
 - the length of each interruption on FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

For a UE with per-UE gap capability:

- for neighbour cell in FR1 or FR2:
 - the percentage of interrupted slots on uplink and downlink on FR1 and FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1.
 - the length of each interruption on FR1 and FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

Table 8.2.2.2.6-1: Requirements on maximum percentage of interrupted slots in serving cell in interfrequency SFTD

SFTD	Serving	Neighbour cell SMTC periodicity					
configuration	cell µ	5ms	10ms	20ms	40ms	80ms	160ms
With RSRP	0						
report	1	[8.4%]	[6.3%]	[8.4%]	[6.3%]	[5.3%]	[4.7%]
	2	[0.4 /0]	[0.5%]	[0.4 /0]	[0.576]	[5.5%]	[4.7 /0]
	3						
Without RSRP	0						
report	1	[11.4%]	[8.6%]	[7.9%]	[6.8%]	[6.3%]	[6.0%]
	2	[11.470]	[0.0%]	[1.9%]	[0.0%]	[0.3%]	[0.0%]
	3						

Table 8.2.2.2.6-2: Interruption duration for FR1 serving cell in inter-frequency SFTD with neighbour cell in FR1

μ	NR Slot length (ms)	Interruption length (slots)
0	1	[1]
1	0.5	[2]
2	0.25	[4]
3	0.125	[8]

Table 8.2.2.2.6-3: Void

Table 8.2.2.2.6-4: Void

8.2.3 NE-DC Interruptions

8.2.3.1 Introduction

This clause contains the requirements related to the interruptions on PCell and SCell, when

E-UTRA PSCell transitions between active and non-active during DRX, or

E-UTRA PSCell transitions from non-DRX to DRX, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is added or released, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA SCG or NR MCG or

PUSCH/PUCCH carrier configuration and deconfiguration in NR MCG, or

UL/DL BWP is switched on PCell or SCell in MCG.

The requirements shall apply for NE-DC with an NR PCell.

This clause contains interruptions where victim cell is PCell or SCell belonging to MCG. Requirements for interruptions requirements when the victim cell is E-UTRA PSCell or E-UTRA SCell belonging to SCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gaps, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.3.2 Requirements

8.2.3.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions between active and non-active druing DRX when PCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.3.2.1-1.

Table 8.2.3.2.1-1: Interruption length X at transition between active and non-active during DRX

μ	NR Slot length (ms)	Interruptio (slo	_
		Sync Async	

Ī	0	1	1	2
I	1	0.5	1	2
I	2	0.25	3	3
	3	0.125	5	

When both PCell and E-UTRA PSCell are in DRX, no interruption is allowed.

8.2.3.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions from non-DRX to DRX when PCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.3.2.1-1.

8.2.3.2.3 Interruptions at PSCell/SCell addition/release

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell.

When one E-UTRA PSCell/SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the E-UTRA PSCell/SCells being added or released, or
 - of up to max{Y1 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA PSCell/SCells being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA PSCell/SCells being added or released are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above activated serving cells in MCG;

Where X1 and Y1 are specified in Table 8.2.3.2.3-1.

When one SCell in MCG is added or released:

- the UE is allowed an interruption on any activated serving cell in MCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to Y1 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being added when one SCell is added;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.3.2.3-2.

Table 8.2.3.2.3-1: Interruption length X1 and Y1 at E-UTRA PSCell/SCell addition/release

μ	NR Slot length	Interruption length X1 (slots)				Interruption le	ngth Y1 (slots)
	(ms)	Sync	Async	Sync	Async		
0	1	1	2	1	2		
1	0.5	2	3	2	3		
2	0.25		5	4	5		
3	0.125		9	N/A	N/A		

Table 8.2.3.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and victim cell are on FR2	4	4
		Either aggressor cell or victim cell is on FR1	5	
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.3.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell and one SCell.

When one E-UTRA SCell in SCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the E-UTRA SCells being activated or deactivated, or
 - of up to max{Y2 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being activated or deactivated are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in MCG.

Where X2 and Y2 are specified in Table 8.2.3.2.4-1.

When one SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any serving cell in MCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to Y2 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being activated when one SCell is activated;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.3.2.4-2.

Table 8.2.3.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

μ	NR Slot length	Interruption length X2 (slots)		Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125		5	N/A	N/A

Table 8.2.3.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption leng	Interruption length X2 (slots)		
0	1	1	1		
1	0.5	1		1	
2	0.25	Both aggressor cell and victim cell are on FR2			
		Either aggressor cell or victim cell is on FR1			
3	0.125	Aggressor cell is on FR2	4	4	
		Aggressor cell is on FR1	5		

8.2.3.2.5 Interruptions during measurements on SCC

8.2.3.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PCell and other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3.

8.2.3.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in SCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slot, if the PCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slot + SMTC duration, if the PCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Where X3 and Y3 are specified in Table 8.2.3.2.5-1

Table 8.2.3.2.5-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length		n length X3 ots)	Interruption le	ength Y3 (slot)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125		5	N/A	N/A

8.2.3.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NE-DC.

When an UL carrier or supplementary UL carrier is configured or deconfigured, an interruption of up to X4 slot as specified in Table 8.2.3.2.6-1, is allowed during the RRC reconfiguration procedure [2] on PCell, all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell, all activated E-UTRA SCells, E-UTRA PSCell and all activated SCells within the same FR as the configured or deconfigured UL.

Table 8.2.3.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

μ	NR Slot length (ms)	•	n length X4 ots)
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25	:	5
3	0.125		9

8.2.3.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed an interruption on PCell and any activated SCells as defined in clause 8.2.2.2.5.

8.2.4 NR-DC: Interruptions

8.2.4.1 Introduction

This clause contains the requirements related to the interruptions on PCell, PSCell and activated SCell if configured, when

up to TBD SCells are configured, de-configured, activated or deactivated or,

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell, PSCell or SCell.transitions between active and non-active during DRX, or transitions from non-DRX to DRX.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

Editor's Note: The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command. How to specify this is FFS.

The requirements shall apply for NR-DC with an NR PCell, PSCell or SCell.

For a UE which does not support per-FR measurement gaps, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For UE which support per-FR gaps, interruptions to PCell, PSCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.4.2 Requirements

8.2.4.2.1 Interruptions at PSCell/SCell addition/release

When PSCell or any number of SCells between one and TBD is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any activated serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.1-1, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to the duration shown in table 8.2.4.2.1-2, if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot.

Table 8.2.4.2.1-1: Interruption duration for PSCell/SCell addition/release for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruptio	n length (slots)
0	1		1
1	0.5	2	
2	0.25	Both aggressor cell and victim cell are on FR2	4
		Either aggressor cell or victim cell is on FR1	5
3	0.125	Aggressor cell is on FR2	8
		Aggressor cell is on FR1	9

Table 8.2.4.2.1-2: Interruption duration for SCell addition/release for intra-band DC/CA

MD Clot Interruption length (clote)

μ	length (ms)	interruption length (slots)	
0	1	1 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$	
1	0.5	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$	
2	0.25	$4 + T_{SMTC_duration} * N_{slot}^{subframe, \mu}$	
3	0.125	8 + T _{SMTC_duration} * $N_{ m slot}^{ m subframe, } \mu$	
NOTE 1: T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above activeserving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.			
NOTE	2: N _{slot}	$^{\mu}$ is as defined in TS 38.211 [6].	

8.2.4.2.2 Interruptions at SCell activation/deactivation

When a SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.2-1, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to the duration shown in table 8.2.4.2.2-2, if the active serving cells are in the same band as any of the SCells being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot.

Table 8.2.4.2.2-1: Interruption duration for SCell activation/deactivation for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)	
0	1	1	
1	0.5	1	
2	0.25	Both aggressor cell and victim cell are on FR2	2
		Either aggressor cell or victim cell is on FR1	3
3	0.125	Aggressor cell is on FR2	4
		Aggressor cell is on FR1	5

Table 8.2.4.2.2-2: Interruption duration for SCell activation/deactivation for intra-band DC/CA

μ	NR Slot length (ms)	Interruption length (slots)	
0	1	1 + T _{SMTC_duration} * N _{slot}	
1	0.5	1 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$	
2	0.25	2 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$	
3	0.125	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$	
NOTE 1: T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated; - the longest SMTC duration among all active serving cells in the same band when one SCell is deactivated.			
NOTE 2:	$N_{\rm slot}^{\rm subframe,\mu}$ is as defined in TS 38.211 [6].		

8.2.4.2.3 Interruptions during measurements on SCC

Interruptions on PCell due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.1 if the PCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 8.2.2.2.2.2 if the PCell is in the same band as the deactivated SCell.

Interruptions on activated SCell due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.2-1 if the activated SCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 8.2.2.2.2-2 if the activated SCell is in the same band as the deactivated SCell.

8.2.4.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR-DC as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.4.2.4-1, is allowed during the RRC reconfiguration procedure [2] on all the other activated serving cells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of all the other serving cells within the same FR as the configured or de-configured UL.

Table 8.2.4.2.4-1: Interruption duration for UL carrier RRC reconfiguration

и	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.4.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer bwp-InactivityTimer defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed to cause an interruption on any other serving cells as defined in clause 8.2.2.2.5.

8.2.4.2.6 Interruptions at transitions between active and non-active during DRX

When PCell is in non-DRX and PSCell is in DRX, interruptions on PCell and the activated SCell in MCG if configured due to transitions from active to non-active and from non-active to active during PSCell DRX are allowed with up to 1% probability of missed ACK/NACK when the configured PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PSCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

When PSCell is in non-DRX and PCell is in DRX, interruptions on PSCell on the activated SCell in SCG if configured due to transitions from active to non-active and from non-active to active during PCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

Table 8.2.4.2.6-1: Interruption length X at transition between active and non-active during DRX

μ	NR Slot length (ms)		on length X ots)
		Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25	;	3
3	0.125	;	5

When both PCell and PSCell are in DRX, no interruption is allowed.

8.2.4.2.7 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell in MCG if configured due to PSCell transitions from non-DRX to DRX when PCell is in non-DRX shall not exceed X slot as defined in table 8.2.4.2.6-1.

Interruption on PSCell and the activated SCell in SCG if configured due to PCell transitions from non-DRX to DRX when PSCell is in non-DRX shall not exceed X slot as defined in table 8.2.4.2.6-1.

8.3 SCell Activation and Deactivation Delay

8.3.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to activate a deactivated SCell and deactivate an activated SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

The requirements shall apply for EN-DC, standalone NR carrier aggregation, NE-DC, and NR-DC.

8.3.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation or in NE-DC or in NR-DC and when one SCell is being activated.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in slot n, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot $n + T_{NAR} + T_{SCR} T_{Reporting}$

 $\frac{T_{HARQ} + T_{activation_time} + T_{CSI_Reporting}}{NR \, slot \, length} \, , \, \text{where:}$

T_{HARO} (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

T_{activation_time} is the SCell activation delay in millisecond.

If the SCell is known and belongs to FR1, Tactivation time is:

- T_{FirstSSB}+ 5ms, if the SCell measurement cycle is equal to or smaller than 160ms.
- $T_{FirstSSB\ MAX} + T_{rs} + 5ms$, if the SCell measurement cycle is larger than 160ms.

If the SCell is unknown and belongs to FR1, provided that the side condition $\hat{E}s/Iot \ge [-2]dB$ is fulfilled, $T_{activation_time}$ is:

- $T_{FirstSSB_MAX} + T_{SMTC_MAX} + 2*T_{rs} + 5ms$ provided

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then $T_{activation_time}$ is $T_{FirstSSB}$ + 5ms provided:

- The UE is provided with SMTC for the target SCell, and
- The SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in clause 3.6.3.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE is not provided with any SMTC for the target SCell, T_{activation time} is 3 ms, provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2 band.

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation time is:

- $T_{FineTiming}$ + 5ms, if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.
- Tuncertainty_MAC +TFineTiming + 5ms, if UE receives TCI state activation command after SCell activation command...

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation_time is:

- max(Tuncertainty_MAC + 5ms + TFineTiming, Tuncertainty_RRC + TRRC_delay-THARQ), where Tuncertainty_MAC=0 if UE receives the SCell activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition \hat{E} s/Iot \geq [-2]dB is fulfilled, then $T_{activation_time}$ is:

 $- 8ms + 24*T_{rs} + T_{uncertainty_MAC} + T_{L1-RSRP, \, measure} + T_{L1-RSRP, \, report} + T_{HARQ} + T_{FineTiming}$

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition $\hat{E}s/Iot \ge [-2]dB$ is fulfilled, then $T_{activation time}$ is:

- $3ms + 24*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report} + max \{(T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty_RRC} + T_{RRC_delay})\}.$

Where.

T_{SMTC MAX}:

- In FR1, in case of intra-band SCell activation, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, T_{SMTC_MAX} is the SMTC periodicity of SCell being activated.
- In FR2, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided that in Rel-15 only support FR2 intra-band CA.
- T_{SMTC MAX} is bounded to a minimum value of 10ms.

 T_{rs} is the SMTC periodicity of the SCell being activated if the UE has been provided with an SMTC configuration for the SCell in SCell addition message, otherwise T_{rs} is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement which involves T_{rs} is applied with T_{rs} = 5ms assuming the SSB transmission periodicity is 5ms. There is no requirements if the SSB transmission periodicity is not 5ms

 $T_{FirstSSB}$: is the time to first SSB indicated by the SMTC after slot $n + T_{HARO} + 3ms$

T_{FirstSSB MAX}: Is the time to first SSB indicated by the SMTC after slot n + T_{HARO}+3ms, further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCell being activated is transmitting SSB burst.
- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

 $T_{\text{FineTiming}}$ is the time period between UE finish processing the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS (when applicable) and the timing of first complete available SSB corresponding to the TCI state.

 $T_{L1\text{-RSRP, measure}}$ is L1-RSRP measurement delay $T_{L1\text{-RSRP_Measurement_Period_SSB}}$ (ms) or $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}}$ based on applicability as defined in clause 9.5 assuming M=1.

T_{L1-RSRP, report} is delay of acquiring CSI reporting resources.

T_{uncertainty_MAC} is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable) relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

 $T_{uncertainty_RRC}$ is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

T_{RRC delay} is the RRC procedure delay as specified in [2].

 $T_{CSI_reporting}$ is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2].

SCell in FR1 is known if it has been meeting the following conditions:

- During the period equal to max(5 measCycleSCell, 5 DRX cycles) for FR1 before the reception of the SCell activation command:
 - the UE has sent a valid measurement report for the SCell being activated and

- the SSB measured remains detectable according to the cell identification conditions specified in clause 9.2 and 9.3.
- the SSB measured during the period equal to max(5 measCycleSCell, 5 DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

For the first SCell activation in FR2 bands, the SCell is known if it has been meeting the following conditions:

- During the period equal to [4s] for UE supporting power class 1 and [3s] for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):
 - the UE has sent a valid L3-RSRP measurement report with SSB index
 - SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation
- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

Otherwise, the first SCell in FR2 band is unknown. The requirement for unknown SCell applies provided that the activation commands for PDCCH TCI, PDSCH TCI (when applicable), semi-persistent CSI-RS for CQI reporting (when applicable), and configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) are based on the latest valid L1-RSRP reporting.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of smtc2 prior to the activation command, T_{SMTC_Scell} follows smtc1 or smtc2 according to the physical cell ID of the target cell being activated. T_{SMTC_MAX} follows smtc1 or smtc2 according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.331 [2] for a SCell at the first opportunities for the corresponding actions once the SCell is activated.

The interruption on PSCell or any activated SCell in SCG for EN-DC mode specified in clause 8.2 shall not occur before slot $n+1+\frac{T_{HARQ}}{NR\ slot\ length}$ and not occur after slot $n+1+\frac{T_{HARQ}+3+T_{SMTC_MAX}+T_{SMTC_duration}}{NR\ slot\ length}$.

The interruption on PCell or any activated SCell in MCG for NR standalone mode specified in clause 8.2 shall not occur before slot $n+1+\frac{T_{HARQ}}{NR\;slot\;length}$ and not occur after slot $n+1+\frac{T_{HARQ}+3+T_{SMTC_MAX}+T_{SMTC_duration}}{NR\;slot\;length}$.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

8.3.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

Upon receiving SCell deactivation command or upon expiry of the *sCellDeactivationTimer* in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$.

The interruption on PSCell or any activated SCell in SCG for EN-DC mode specified in clause 8.2 shall not occur before slot $n+1+\left[\frac{T_{HARQ}+3ms}{NR\ slot\ length}\right]$ and not occur after slot $n+1+\frac{T_{HARQ}+3ms}{NR\ slot\ length}$.

The interruption on PCell or any activated SCell in MCG for NR standalone mode specified in clause 8.2 shall not occur before slot $n+1+[\frac{T_{HARQ}}{NR \, slot \, leng \, th}]$ and not occur after slot $n+1+\frac{T_{HARQ}+3ms}{NR \, slot \, leng \, th}$.

8.4 UE UL carrier RRC reconfiguration delay

8.4.1 Introduction

The requirements in this clause apply for a UE being configured or deconfigured with a supplementary UL carrier or NR UL carrier.

8.4.2 UE UL carrier configuration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within $T_{UL_carrier_config}$ from the end of the last slot containing the RRC command.

T_{UL_carrier_config} equals the maximum RRC procedure delay defined in clause 12 in TS 38.331 [2].

8.4.3 UE UL carrier deconfiguration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier deconfiguration RRC signalling, the UE shall stop UL signalling on the deconfigured UL carrier within $T_{UL_carrier_deconfig}$ from the end of the last slot containing the RRC command.

T_{UL_carrier_deconfig} equals the maximum RRC procedure delay defined in clause 12 in TS 38.331 [2].

8.5 Link Recovery Procedures

8.5.1 Introduction

The UE shall assess the downlink radio link quality of a serving cell based on the reference signal in the set \bar{q}_0 as specified in TS 38.213 [3] in order to detect beam failure on:

- PCell in SA, NR-DC, or NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The RS resource configurations in the set \bar{q}_0 can be periodic CSI-RS resources and/or SSBs. UE is not required to perform beam failure detection outside the active DL BWP. UE is not required to meet the requirements in clause 8.5.2 and 8.5.3 if UE does not have set \bar{q}_0 .

On each RS resource configuration in the set \overline{Q}_0 , the UE shall estimate the radio link quality and compare it to the threshold Q_{out_LR} for the purpose of accessing downlink radio link quality of the serving cell beams.

The threshold Q_{out_LR} is defined as the level at which the downlink radio level link of a given resource configuration on set \overline{Q}_0 cannot be reliably received and shall correspond to the BLER_{out} = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection, $Q_{out_LR_SSB}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.2.1-1. For CSI-RS based beam failure detection, $Q_{out_LR_CSI-RS}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.3.1-1.

Upon request the UE shall deliver configuration indexes from the set \overline{q}_l as specified in TS 38.213 [3], to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Q_{in_LR} , which is indicated by higher layer parameter rsrp-ThresholdSSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained from an SSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement

obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer parameter *powerControlOffsetSS*. The RS resource configurations in the set \overline{q}_{l} can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS resources. UE is not required to perform candidate beam detection outside the active DL BWP.

8.5.2 Requirements for SSB based beam failure detection

8.5.2.1 Introduction

The requirements in this clause apply for each SSB resource in the set \bar{q}_0 configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2.

Table 8.5.2.1-1: PDCCH transmission parameters for beam failure instance

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	0dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	0dB
Bandwidth (PRBs)	24
Sub-carrier spacing (kHz)	Same as the SCS of RMSI CORESET
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.5.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set \overline{Q}_0 estimated over the last $T_{\text{Evaluate_BFD_SSB}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_SSB}}$ within $T_{\text{Evaluate_BFD_SSB}}$ ms period.

The value of $T_{Evaluate\ BFD\ SSB}$ is defined in Table 8.5.2.2-1 for FR1.

The value of T_{Evaluate_BFD_SSB} is defined in Table 8.5.2.2-2 for FR2 with scaling factor N=8

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB.
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2.

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- $P = P_{sharing \ factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).

- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTConviol}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the
 - BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP, T_{SMTCperiod})}}$, when the BFD-RS resource is partially overlapped with measurement gap (T_{SSB}

<MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{sharing factor} = 1$
 - if all of the reference signals configured for BFD outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for BFD outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by *SSB-ToMeasure* and 1 symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

Longer evaluation period would be expected if the combination of BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 8.5.2.2-1: Evaluation period T_{Evaluate BFD SSB} for FR1

Configuration	T _{Evaluate_BFD_SSB} (ms)	
no DRX	Max(50, Ceil(5 \times P) \times T _{SSB})	
DRX cycle ≤ 320ms	$Max(50, Ceil(7.5 \times P) \times Max(T_{DRX}, T_{SSB}))$	
DRX cycle > 320ms	Ceil(5 \times P) \times T _{DRX}	
Note: T _{SSB} is the periodicity of SSB in the set \overline{q}_0 . T _{DRX} is the DRX cycle length.		

Table 8.5.2.2-2: Evaluation period T_{Evaluate_BFD_SSB} for FR2

Configuration	T _{Evaluate_BFD_SSB} (ms)	
no DRX	Max(50, Ceil(5 \times P \times N) \times T _{SSB})	
DRX cycle ≤ 320ms	$Max(50, Ceil(7.5 \times P \times N) \times Max(T_{DRX}, T_{SSB}))$	
DRX cycle > 320ms	Ceil($5 \times P \times N$) $\times T_{DRX}$	
Note: $T_{\rm SSB}$ is the periodicity of SSB in the set $\overline{q}_{\rm 0}$. $T_{\rm DRX}$ is the DRX cycle length.		

8.5.2.3 Measurement restriction for SSB based beam failure detection

The UE is required to be capable of measuring SSB for BFD without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for BFD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for BFD measurement without any restriction:
- If SSB and CSI-RS have different SCS,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for BFD measurement without any restriction;
 - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

For FR2, when the SSB for BFD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

8.5.3 Requirements for CSI-RS based beam failure detection

8.5.3.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \overline{q}_0 of resource configurations for a serving cell, provided that the CSI-RS resource(s) in set \overline{q}_0 for beam failure detection are actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.3.2. UE is not expected to perform beam failure detection measurements on the CSI-RS configured for BFD if the CSI-RS is not QCL-ed, with QCL-TypeD when applicable, with the RS in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.5.3.1-1: PDCCH transmission parameters for beam failure instance

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	0dB
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	0dB
Bandwidth (PRBs)	48
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.5.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in set \bar{q}_0 estimated over the last $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_CSI-RS}}$ within $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period.

The value of T_{Evaluate_BFD_CSI-RS} is defined in Table 8.5.3.2-1 for FR1.

The value of T_{Evaluate_BFD_CSI-RS} is defined in Table 8.5.3.2-2 for FR2 with N=1. The requirements of T_{Evaluate_BFD_CSI-RS} apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS.
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the BFD-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP} \frac{T_{CSI-RS}}{T_{SMTCneriod}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the

BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MRGP}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRGP,T_{SMTCperiod})}}$, when the BFD-RS resource is partially overlapped with measurement gap ($T_{CSI-RS} < \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRGP,T_{SMTCperiod})}}$

MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 3$.

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

Note: The overlap between CSI-RS for BFD and SMTC means that CSI-RS for BFD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

The values of M_{BFD} used in Table 8.5.3.2-1 and Table 8.5.3.2-2 are defined as

- $M_{BFD} = 10$, if the CSI-RS resource(s) in set \overline{q}_0 used for BFD is transmitted with Density = 3.

Table 8.5.3.2-1: Evaluation period T_{Evaluate_BFD_CSI-RS} for FR1

Configuration	Tevaluate_BFD_CSI-RS (ms)	
no DRX	$Max(50, [M_{BFD} \times P] \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	$Max(50, [1.5 \times M_{BFD} \times P] \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$[M_{BFD} \times P] \times T_{DRX}$	
Note: T _{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_{0} . T _{DRX} is the		
DRX cycle length.		

Table 8.5.3.2-2: Evaluation period T_{Evaluate_BFD_CSI-RS} for FR2

Configuration	Tevaluate_BFD_CSI-RS (ms)	
no DRX	Max(50, $[M_{BFD} \times P \times N] \times T_{CSI-RS}$)	
DRX cycle ≤ 320ms	$Max(50, [1.5 \times M_{BFD} \times P \times N] \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$[M_{BFD} \times P \times N] \times T_{DRX}$	
Note: T _{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_{0} . T _{DRX} is the		
DRX cycle length.		

8.5.3.3 Measurement restrictions for CSI-RS beam failure detection

The UE is required to be capable of measuring CSI-RS for BFD without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.
 - The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in set \overline{q}_1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the RS resources in set \overline{q}_0 is worse than Q_{out_LR} , layer 1 of the UE shall send a beam failure instance indication to the higher layers. A layer 3 filter may be applied to the beam failure instance indications as specified in TS 38.331 [2].

The beam failure instance evaluation for the RS resources in set \bar{q}_0 shall be performed as specified in clause 6 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication_interval_BFD}$.

When DRX is not used, $T_{Indication_interval_BFD}$ is max(2ms, $T_{SSB-RS,M}$) or max(2ms, $T_{CSI-RS,M}$), where $T_{SSB-RS,M}$ and $T_{CSI-RS,M}$ is the shortest periodicity of all RS resources in set \bar{q}_0 for the accessed cell, corresponding to either the shortest periodicity of the SSB in the set \bar{q}_0 or CSI-RS resource in the set \bar{q}_0 .

When DRX is used, for SSB based link quality measurement,

- $T_{Indication\ interval\ BFD} = Max(1.5 \times DRX_cycle_length, 1.5 \times T_{SSB-RS,M})$, if DRX_cycle_length ≤ 320 ms,
- T_{Indication_interval_BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

When DRX is used, for CSI-RS based link quality measurement,

- T_{Indication_interval_BFD} = Max(1.5 × DRX_cycle_length, 1.5 × T_{CSI-RS,M}), if DRX_cycle_length ≤ 320ms,
- T_{Indication_interval_BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

8.5.5 Requirements for SSB based candidate beam detection

8.5.5.1 Introduction

The requirements in this clause apply for each SSB resource in the set \overline{q}_1 configured for a serving cell, provided that the SSBs configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.5.2.

8.5.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set \bar{q}_1 estimated over the last T_{Evaluate_CBD_SSB} ms period becomes better than the threshold Q_{in_LR} provided SSB_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle \leq 320ms.

The value of $T_{Evaluate_CBD_SSB}$ is defined in Table 8.5.5.2-1 for FR1.

The value of T_{Evaluate CBD SSB} is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8.

Where,

For FR1.

- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB,
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2.

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is P_{sharing factor}, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period (T_{SSB} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC
 - candidate beam detection RS is partially overlapped with SMTC occasion (T_{SSB} < T_{SMTCperiod}) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP,T_{SMTCperiod})}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1
 - if all of the reference signals configured for CBD outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for CBD outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

Table 8.5.5.2-1: Evaluation period T_{Evaluate CBD SSB} for FR1

Configuration		TEvaluate_CBD_SSB (ms)	
non-DRX, DRX cycle		$Max(25, Ceil(3 \times P) \times T_{SSB})$	
\$	≨ 320ms		
DRX cycle > 320ms		$Ceil(3 \times P) \times T_{DRX}$	
Note:	T _{SSB} is the periodicity of SSB in the set $\ \overline{q}_{ m l}$. T _{DRX} is the DRX cycle		
	length.		

Table 8.5.5.2-2: Evaluation period T_{Evaluate_CBD_SSB} for FR2

Configuration		TEvaluate_CBD_SSB (ms)	
non-DRX, DRX cycle		Max(25, Ceil($3 \times P \times N$) $\times T_{SSB}$)	
≤ 320ms			
DRX cycle > 320ms		$Ceil(3 \times P \times N) \times T_{DRX}$	
Note:	e: $T_{\rm SSB}$ is the periodicity of SSB in the set $\overline{q}_{\rm I}$. $T_{\rm DRX}$ is the DRX cycle		
	length.		

8.5.5.3 Measurement restriction for SSB based candidate beam detection

For FR1, when the SSB for CBD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for CBD measurement without any restrictions;
- If SSB and CSI-RS have different SCS-es,
 - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for CBD measurement without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

For FR2, when the SSB for CBD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

8.5.6 Requirements for CSI-RS based candidate beam detection

8.5.6.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \bar{q}_1 configured for a serving cell, provided that the CSI-RS resources configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.6.2.

8.5.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period becomes better than the threshold $Q_{\text{in_LR}}$ within $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period provided CSI-RS $\hat{\text{Es/Iot}}$ is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

The value of T_{Evaluate CBD CSI-RS} is defined in Table 8.5.6.2-1 for FR1.

The value of $T_{\text{Evaluate_CBD_CSI-RS}}$ is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2.

- P = 1, when candidate beam detection RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate

beam detection RS is partially overlapped with SMTC occasion (T_{CSI-RS} < T_{SMTCperiod}).

- P = 3, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion (T_{CSI-RS} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when candidate beam detection RS is partially overlapped with measurement gap

and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRGP,T_{SMTCperiod})}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)

Longer evaluation period would be expected if the CSI-RS is on the same OFDM symbols with RLM, BFD, BM-RS, or other CBD-RS, according to the measurement restrictions defined in clause 8.5.6.3.

The values of M_{CBD} used in Table 8.5.6.2-1 and Table 8.5.6.2-2 are defined as

- $M_{CBD} = 3$, if the CSI-RS resource configured in the set \overline{q}_1 is transmitted with Density = 3.

Table 8.5.6.2-1: Evaluation period T_{Evaluate CBD CSI-RS} for FR1

Configuration		T _{EvaluateC_CBD_CSI-RS} (ms)	
non-DRX, DRX cycle		$Max(25, Ceil(M_{CBD} \times P) \times T_{CSI-RS})$	
≤ 320ms			
DRX cycle > 320ms		$Ceil(M_{CBD} \times P) \times T_{DRX}$	
Note:	T _{CSI-RS} is the periodicity of CSI-RS resource in the set $\ \overline{q}_1$. T _{DRX} is the		
DRX cycle length.			

Table 8.5.6.2-2: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR2

Configuration		TEvaluate_CBD_CSI-RS (ms)	
non-DRX, DRX cycle		$Max(25, Ceil(M_{CBD} \times P \times N) \times T_{CSI-RS})$	
≤ 320ms			
DRX cycle > 320ms		$Ceil(M_{CBD} \times P \times N) \times T_{DRX}$	
Note:	ote: T _{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_1 . T _{DRX} is the		
	DRX cycle length.		

8.5.6.3 Measurement restriction for CSI-RS based candidate beam detection

For both FR1 and FR2, when the CSI-RS for CBD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for CBD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS based CBD measurement for without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer measurement period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for CBD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for CBD measurement without any restriction.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and the other CSI-RS. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

8.5.7 Scheduling availability of UE during beam failure detection

Scheduling availability restrictions when the UE is performing beam failure detection are described in the following clauses.

8.5.7.1 Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to beam failure detection performed on SSB and CSI-RS configured for BFD with the same SCS as PDSCH or PDCCH in FR1.

8.5.7.2 Scheduling availability of UE performing beam failure detection with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to beam failure detection when SSB is configured as BFD. For UEs which do not support

simultaneousRxDataSSB-DiffNumerology [14] the following restrictions apply due to beam failure detection when SSB is configured as BFD.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on FR1 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which PCell or PSCell is configured.

8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON
 - There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for BFD mesurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for BFD measurement.

8.5.7.4 Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR DC

There are no scheduling restrictions on FR1 serving cell(s) due to beam failure detection performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to beam failure detection performed on FR1 serving PCell and/or PSCell.

Editor's Note: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.5.8 Scheduling availability of UE during candidate beam detection

Scheduling availability restrictions when the UE is performing L1-RSRP measurement for candidate beam detection are described in the following clauses.

8.5.8.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as link recovery detection resource with the same SCS as PDSCH or PDCCH in FR1.

8.5.8.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as link recovery detection resource. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as link recovery detection resource.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, TRS, CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for L1-RSRP.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on one serving cell apply to all other serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands.

8.5.8.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to candidate beam detection

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, CSI-RS for tracking or CSI-RS for CQI on reference symbols to be measured for candidate beam detection.

When intra-band carrier aggregation in FR2 is configured, the scheduling restrictions on to one serving cell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for CBD measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for CBD measurement.

8.5.8.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

Editor's Note: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.6 Active BWP switch delay

8.6.1 Introduction

The requirements in this clause apply for a UE configured with more than one BWP on PCell or any activated SCell in standalone NR or NE-DC, PCell, PSCell or any activated SCell in MCG or SCG in NR-DC, or PSCell or any activated SCell in SCG in EN-DC. UE shall complete the switch of active DL and/or UL BWP within the delay defined in this clause.

8.6.2 DCI and timer based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC.

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelav} which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals until the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n except DCI triggering BWP switch on the cell where DCI-based BWP switch occurs. The UE is not required to follow the requirements defined in this clause when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where slot n is the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer bwp-InactivityTimer [2] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals during time duration T_{BWPswitchDelay} after bwp-*InactivityTimer* [2] expires on the cell where timer-based BWP switch occurs.

Depending on UE capability bwp-Switching Delay [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

NR Slot BWP switch delay TrwpswitchDelay (slots)

μ	length (ms)	BWF SWITCH delay 1 BWFSWITCHDelay (SIOtS)	
		Type 1 ^{Note 1}	Type 2 ^{Note 1}
0	1	1	3
1	0.5	2	5
2	0.25	3	9
3	0.125	6	18

Table 8.6.2-1: BWP switch delay

Depends on UE capability. Note 1:

Note 2: If the BWP switch involves changing of SCS, the BWP switch delay is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch.

Provided the UE does not have the required TCI-state information to receive PDCCH and PDSCH in the new BWP, the UE shall use old TCI-states before the BWP switch until a new MAC CE updating the required TCI-state information for PDCCH and PDSCH is received after the BWP switch.

If UE has the information on the required TCI-state information to receive PDCCH and PDSCH in the new BWP,

- UE shall be able to receive PDCCH and PDSCH with old TCI-states before the delay as specified in Clause 8.10 in the new BWP.
- UE shall be able to receive PDCCH and PDSCH with new TCI-states after the delay as specified in Clause 8.10 in the new BWP

8.6.3 RRC based BWP switch delay

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after a time duration of $\frac{T_{RRCprocessing De lay} + T_{BWPswitchDelayRRC}}{NR Slot \ length}$ slots which begins from the beginning of DL slot n, where

DL slot n is the last slot containing the RRC command, and

 $T_{RRCprocess\,ing\,Delay}$ is the length of the RRC procedure delay in millisecond as defined in clause 12 in TS 38.331 [2], and

 $T_{BWPswitchDelayRRC} = [6]ms$ is the time used by the UE to perform BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ on the cell where RRC-based BWP switch occurs.

8.7 Void

8.8 NE-DC: E-UTRAN PSCell Addition and Release Delay

8.8.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an E-UTRAN PSCell in NR - E-UTRA dual connectivity. The requirements are applicable to an NR - E-UTRA dual connectivity capable UE.

8.8.2 E-UTRAN PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving E-UTRAN PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards E-UTRAN PSCell no later than in subframe $n + T_{\text{config_EUTRAN-PSCell}}$:

Where:

```
T_{config\_EUTRAN-PSCell} = 20ms + T_{activation\_time} + 50ms + T_{PCell\_DU} + T_{E-UTRAN-PSCell\_DU}
```

 $T_{activation_time}$ is the E-UTRAN PSCell activation delay. If the E-UTRAN PSCell is known, then $T_{activation_time}$ is 20ms. If the E-UTRAN PSCell is unknown, then $T_{activation_time}$ is 30ms provided the E-UTRAN PSCell can be successfully detected on the first attempt.

 T_{PCell_DU} is the delay uncertainty due to PCell PRACH preamble transmission. T_{PCell_DU} is up to 20ms if E-UTRAN PSCell activation is interrupted by a PCell PRACH preamble transmission, otherwise it is 0.

 $T_{\text{E-UTRAN-PSCell_DU}}$ is the delay uncertainty in acquiring the first available PRACH occasion in the E-UTRAN PSCell. $T_{\text{E-UTRAN-PSCell_DU}}$ is up to 30ms.

E-UTRAN PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the E-UTRAN PSCell configuration command:

- the UE has sent a valid measurement report for the E-UTRAN PSCell being configured and
- the E-UTRAN PSCell being configured remains detectable according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15],
- E-UTRAN PSCell being configured also remains detectable during the E-UTRAN PSCell configuration delay T_{config_EUTRAN-PSCell}:according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15].

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.8.3 E-UTRAN PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and E-UTRAN PSCell, and may also be configured with one or more SCells and/or E-UTRAN SCells.

Upon receiving E-UTRAN PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe n+20.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9 NR-DC: PSCell Addition and Release Delay

8.9.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an PSCell in NR dual connectivity. The requirements are applicable to an NR dual connectivity capable UE.

8.9.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in subframe $n + T_{\text{config_PSCell}}$:

Where:

$$T_{config}$$
 PSCell = T_{RRC} delay + $T_{processing}$ + T_{search} + T_{Δ} + T_{PSCell} DU + 2 ms

T_{RRC delay} is the RRC procedure delay as specified in TS 38.331 [2].

 $T_{processing} \ is \ the \ SW \ processing \ time \ needed \ by \ UE, \ including \ RF \ warm \ up \ period. \ T_{processing} = 40 \ ms.$

 T_{search} is the time for AGC settling and PSS/SSS detection. If the target cell is known, $T_{search} = 0$ ms. If the target cell is unknown and the target cell $\hat{E}_s/Iot \ge -2dB$, $T_{search} = 24*$ Trs ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta}=1*Trs$ ms for a known or unknown PSCell.

T_{PSCell_DU} is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. T_{PSCell_DU} is up to the summation of SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

In FR1 and FR2, the PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the PSCell configuration command:

- the UE has sent a valid measurement report for the PSCell being configured and
- One of the SSBs measured from the PSCell being configured remains detectable according to the cell identification conditions specified in clause 9.3.
- One of the SSBs measured from PSCell being configured also remains detectable during the PSCell configuration delay T_{config_PSCell} according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9.3 PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and one PSCell.

Upon receiving PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe $n+T_{RRC_delay}$:

Where

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.10 Active TCI state switching delay

8.10.1 Introduction

The requirements in this clause apply for a UE configured with one or more TCI state configurations on serving cell in MR-DC or standalone NR. UE shall complete the switch of active TCI state within the delay defined in this clause.

8.10.2 Known conditions for TCI state

The TCI state is known if the following conditions are met:

- During the period from the last transmission of the RS resource used for the L1-RSRP measurement reporting
 for the target TCI state to the completion of active TCI state switch, where the RS resource for L1-RSRP
 measurement is the RS in target TCI state or QCLed to the target TCI state
 - TCI state switch command is received within 1280 ms upon the last transmission of the RS resource for beam reporting or measurement
 - The UE has sent at least 1 L1-RSRP report for the target TCI state before the TCI state switch command
 - The TCI state remain detectable during the TCI state switching period
 - The SSB associated with the TCI state remain detectable during the TCI switching period
 - SNR of the TCI state > -3dB

Otherwise, the TCI state is unknown.

8.10.3 MAC-CE based TCI state switch delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ T_{HARQ} +(3 ms +TO_k*($T_{first-SSB}$ + $T_{SSB-proc}$)) / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+ T_{HARQ} +(3 ms +TO_k*($T_{first-SSB}$)) / NR slot length.

Where T_{HARO} is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3];

T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE;

 $T_{SSB-proc} = 2 \text{ ms};$

 $TO_k = 1$ if target TCI state is not in the active TCI state list for PDSCH, 0 otherwise.

If the target TCI state is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+

 $T_{HARQ} + (3 \text{ ms} + T_{L1\text{-}RSRP} + TO_{uk}*(T_{first\text{-}SSB} + T_{SSB\text{-}proc})) / \textit{NR slot length}. \text{ The UE shall be able to receive PDCCH with the old TCI state until slot } n + T_{HARQ} + (3 \text{ ms} + T_{L1\text{-}RSRP} + TO_{uk}*(T_{first\text{-}SSB})) / \textit{NR slot length}.$

Where T_{L1-RSRP} is the time for L1-RSRP measurement for Rx beam refinement, defined as

- T_{L1-RSRP_Measurement_Period_SSB} for SSB as specified in clause 9.5.4.1,
 - with the assumption of M=1
 - with $T_{Report} = 0$
- T_{L1-RSRP_Measurement_Period_CSI-RS} for CSI-RS as specified in clause 9.5.4.2
 - with the assumption of M=1 for periodic CSI-RS
 - for aperiodic CSI-RS if number of resources in resource set at least equal to MaxNumberRxBeam
 - with $T_{Report} = 0$

 $TO_{uk} = 1$ for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement when TCI state switching involves QCL-TypeD

 $TO_{uk} = 1$ when TCI state switching involves other QCL types

 $T_{L1\text{-RSRP_Measurement_Period_SSB}} = 0$ for SSB in FR2 and $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}} = 0$ for CSI-RS in FR2, provided that the TCI state switching involves QCL-TypeA, QCL-TypeB or QCL-TypeC only.

T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;

T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE for other QCL types;

The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

During MAC-CE based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.4 DCI based TCI state switch delay

If the target TCI state is known, when a UE is configured with the higher layer parameter *tci-PresentInDCI* which is set as 'enabled' for the CORESET scheduling PDSCH at slot n, UE shall be able to receive PDSCH or transmit PUSCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+*timeDurationForQCL*, where, *timeDurationForQCL* is the time required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [26], the value of *timeDurationForQCL* is defined in TS 38.331 [2].

The known condition for TCI state defined in clause 8.10.2 is applied.

During DCI based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.5 RRC based TCI state switch delay

If the target TCI state is known, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ $T_{RRC_processing} + TO_k*(T_{first-SSB} + T_{SSB-proc}) / NR slot length.$ Where $T_{RRC_processing}$ is the RRC processing delay, $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3. The UE is not required to receive PDCCH/PDSCH or transmit PUCCH/PUSCH until the end of switching period.

T_{first-SSB} is time to first SSB transmission after RRC processing by the UE; The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

If the target TCI state is unknown, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ $T_{RRC_processing} + T_{L1-RSRP} + TO_{uk}*(T_{first-SSB} + T_{SSB-proc}) / NR \ slot \ length \ .$ Where $T_{RRC_processing}$ is the RRC processing delay,

and TO_{uk} , $T_{L1\text{-RSRP}}$ are defined in clause 8.10.3. The UE is not required to receive PDCCH/PDSCH or transmit PUCCH/PUSCH until the end of switching period.

T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;

T_{first-SSB} is time to first SSB transmission after RRC processing time at the UE for other QCL types;

The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

The requirements for RRC based TCI state switch delay apply when only 1 TCI state is configured in RRC TCI state list.

During RRC based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.6 Active TCI state list update delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE active TCI state list update at slot n, UE shall be able to receive PDCCH to schedule PDSCH with the new target TCI state no later than slot n+ T_{HARQ} +3ms + T_{Ok} *($T_{first-SSB}$ + $T_{SSB-proc}$) / NR slot length. Where T_{HARQ} , $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3.

8.11 PSCell Change

This clause defines requirements for the delay within which the UE shall be able to change PSCell to other SCell in ENDC or NR-DC. The requirements in this clause are applicable to EN-DC and NR-DC.

Upon receiving PSCell change in subframe n, the UE shall be capable of transmitting PRACH preamble towards the target PSCell no later than specified in clause 8.9.2, where the following value for $T_{processing}$ shall override the existing one:

- $T_{processing} = 20$ ms when source and target cells are in the same FR,
- $T_{processing} = 40$ ms when source and target cells are in different FRs.

The target PSCell is known if it has been meeting the conditions in clause 8.9.2.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

9 Measurement Procedure

9.1 General measurement requirement

9.1.1 Introduction

This clause contains general requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are split in intra-frequency, inter-frequency, inter-RAT E-UTRAN FDD, inter-RAT E-UTRAN TDD, and L1-RSRP measurements requirements. These measurements may be used by the NG-RAN. The measurement quantities are defined in TS38.215 [4], the measurement model is defined in TS38.300 [10], TS37.340 [17] and measurement accuracies are specified in clause 10. Control of measurement reporting is specified in TS 38.331 [2].

In the requirements of clause 9, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2, respectively;

- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers.

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide either per-FR measurement gap patterns for frequency range where UE requires per-FR measurement gap for concurrent monitoring of all frequency layers of each frequency range independently, or a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers of all frequency ranges.

During the per-UE measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].

During the per-FR measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells in the corresponding frequency range for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells in the corresponding frequency range for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

Table 9.1.2-1: Gap Pattern Configurations

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)
0	6	40
1	6	80
2	3	40
3	3 3	80
4	6	20
5	6	160
6	4	20
7	4	40
8	4	80
9	4	160
10	3	20
11	3	160
12	5.5	20
13	5.5	40
14	5.5	80
15	5.5	160
16	3.5	20
17	3.5	40
18	3.5	80
19	3.5	160
20	1.5	20
21	1.5	40
22	1.5	80
23	1.5	160

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
	E-UTRA + FR1, or	non-NR RAT Note1,2	0,1,2,3
Per-UE	E-UTRA + FR2, or	FR1 and/or FR2	0-11
measurement	E-UTRA + FR1 +	non-NR RAT ^{Note1,2}	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2	and FR1 and/or FR2	
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2	0,1,2,3
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR2 only	No gap
	FR2 if configured		12-23
Per FR measurement	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23

Note: In E-UTRA-NR dual connectivity mode, if GSM or UTRA TDD or UTRA FDD inter-RAT frequency layer is configured to be monitored, only measurement gap pattern #0 and #1 can be used for per-FR gap in E-UTRA and FR1 if configured, or for per-UE gap.

NOTE 1: In E-UTRA-NR dual connectivity mode, non-NR RAT includes E-UTRA, UTRA and/or GSM. In NR-E-UTRA dual connectivity mode, non-NR RAT means E-UTRA.

NOTE 2: Void

NOTE 3: When E-UTRA inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.

In E-UTRA-NR dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

In NR-E-UTRA dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR2.

In NR-NR dual connectivity mode,

- If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest SCG subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

T_{MG} is the MG timing advance value provided in *mgta* according to [2].

In determining the measurement gap starting point, UE shall use the DL timing of the latest E-UTRA or NR subframe occurring immediately before the configured measurement gap among E-UTRA or NR serving cells.

Editor's Note: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE configured with E-UTRA-NR dual connectivity or NR-E-UTRA dual connectivity, when serving cells are in E-UTRA and FR1, measurement objects are in both E-UTRA/FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;
- If MN indicates UE that the measurement gap from MN applies to only LTE/FR1 serving cell(s),
 - UE fulfils the measurement requirements for FR1/LTE measurement objects based on the configured measurement gap pattern;
 - UE fulfils the requirements for FR2 measurement objects based on effective MGRP=20ms;

For per-FR measurement gap capable configured with E-UTRA-NR dual connectivity, NR-E-UTRA dual connectivity or NR-NR dual connectivity, when serving cells are in E-UTRA, FR1 and FR2, or in E-UTRA and FR2, or in FR1 and FR2, measurement objects are in both E-UTRA /FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN.

Table 9.1.2-3: Applicability for Gap Pattern Configurations supported by the UE with NR standalone operation (with single carrier, NR CA and NR-DC configuration)

Measurement gap pattern configuration	Serving cell	Measurement Purpose NOTE 2	Applicable Gap Pattern Id
Comiguration		E-UTRA only ^{NOTE3}	0,1,2,3
	FR1 NOTE5, or	FR1 and/or FR2	0-11
	FR1 + FR2	E-UTRAN and FR1 and/or FR2 NOTE3	0, 1, 2, 3, 4, 6, 7, 8,10
Per-UE		E-UTRA only NOTE3	0,1,2,3
measurement		FR1 only	0-11
gap		FR1 and FR2	0-11
	FR2 NOTE5	E-UTRAN and FR1 and/or FR2 NOTE3	0, 1, 2, 3, 4, 6, 7, 8,10
		FR2 only	12-23
	FR1 if configured	E-UTRA only NOTE3	0,1,2,3
	FR2 if configured		No gap
	FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	FR1 if configured	FR2 only	No gap
Per FR	FR2 if configured		12-23
measurement	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured	NOTE3	No gap
9-4	FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	FR1 if configured	E-UTRA and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	NOTE3	12-23
	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	and FR2 NOTE3	12-23

- NOTE 1: When E-UTRA inter-RAT RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.
- NOTE 2: Measurement purpose which includes E-UTRA measurements includes also inter-RAT E-UTRA RSRP and RSRQ measurements for E-CID
- NOTE 3: Void

NOTE4: If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among all serving cells subframes. If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR1.

If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR2.

 T_{MG} is the MG timing advance value provided in *mgta* according to [2]. In determining the measurement gap starting point, UE shall use the DL timing of the latest subframe occurring immediately before the configured measurement gap among serving cells.

NOTE 5: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), for per-FR gap based measurement, when there is no serving cell in a particular FR, where measurement objects are configured, regardless if explicit per-FR measurement gap is configured in this FR, the effective MGRP in this FR is used to determine requirements;

- 20 ms for FR2 NR measurements
- 40 ms for FR1 NR measurements
- 40 ms for LTE measurements
- 40 ms for FR1+LTE measurements

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), when serving cells are in FR1 or FR2, measurement objects are in both E-UTRA /FR1 and FR2,

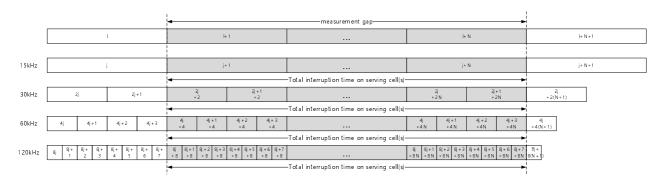
- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;

If measurement gap is configured in one FR but measurement object is not configured in the FR, the scheduling opportunity in the FR depends on the configured measurement gap pattern.

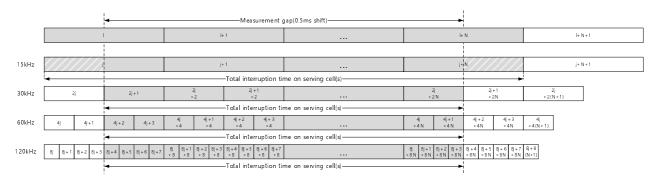
For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in SCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.

For NR standalone operation (with single carrier, NR CA and NR-DC configuration), if UE is not capable of per-FR-gap, total interruption time on a serving cell during MGL is defined when MGL(N) = 6ms, 5.5ms, 4ms, 3.5ms, 3ms, and 1.5ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.

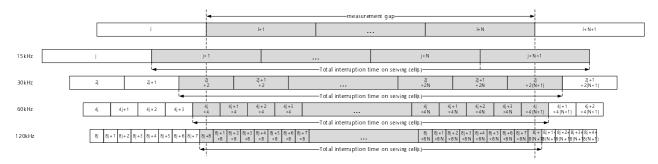
For NR-E-UTRA dual connectivity, if UE is not capable of per-FR-gap, total interruption time on MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in MCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.



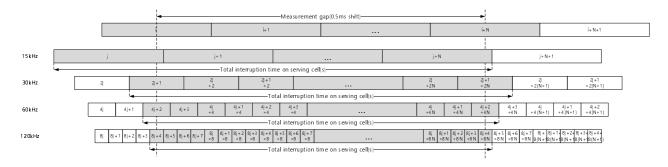
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(c) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for asynchronous EN-DC and asynchronous NE-DC



(d) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for asynchronous EN-DC and asynchronous NE-DC

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC

The corresponding total number of interrupted slots on serving cells is listed in Table 9.1.2-4 for synchronous EN-DC, NR standalone and NE-DC, and in Table 9.1.2-4a for asynchronous EN-DC respectively.

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms
	MGL=6ms MGL=4ms MGL=3ms		MGL=6ms	MGL=4ms	MGL=3ms	
15	6	4	3	7 ^{Note3}	5 ^{Note3}	4 ^{Note3}
30	12	8	6	12	8	6
60	24	16	12	24	16	12
120	48	32	24	48	32	24

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

NOTE 3: Non-overlapped half-slots occur before and after the measurement gap.
Whether a Rel-15 UE can receive and/or transmit in those half-slots is up to
UE implementation.

Table 9.1.2-4a: Total number of interrupted slots on serving cells during MGL for Asynchronous EN-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells						
SCS	When MG t	iming advanc	e of 0ms is	When MG t	iming advanc	ce of 0.5ms	
(kHz)	applied				is applied		
	MGL=6ms MGL=4ms MGL=3ms			MGL=6ms	MGL=4ms	MGL=3ms	
15	7	5	4	7	5	4	
30	13	9	7	13	9	7	
60	25	17	13	25	17	13	
120	49	33	25	49	33	25	

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

In case that UE capable of per-FR measurement gap is configured with per-FR measurement gap for FR2 serving cells, total number of interrupted slots on FR2 serving cells during MGL is listed in Table 9.1.2-4b.

Table 9.1.2-4b: Total number of interrupted slots on FR2 serving cells during MGL for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR2

NR	Total number of interrupted slots on FR2 serving cells					
SCS	When MG timing advance of 0ms is When MG timing advance of 0.25ms is					
(kHz)	applied			applied		
	MGL=5.5ms MGL=3.5ms MGL=1.5ms			MGL=5.5ms	MGL=3.5ms	MGL=1.5ms
60	22	14	6	22	14	6
120	44	28	12	44	28	12

It is up to UE implementation whether or not the UE is able to conduct transmission in the following slot(s),

- when MGTA is not applied, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap
- when MGTA is applied and the SCS of the UL carrier is other than 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap

 when MGTA is applied and the SCS of the UL carrier is 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after the slot partially overlapped with measurement gap

where UL slot denotes that all the symbols in the slot are uplink symbols, and L=1 if $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$ for the UL transmission is less than the length of one slot; L=2 otherwise.

Note: Network is supposed to take into account the possible difference between the estimated TA at network and actual TA at UE when scheduling UE in the above slot(s).

Table 9.1.2-5: (Void)

9.1.2.1 EN-DC: Measurement Gap Sharing

For E-UTRA-NR dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers and inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2][16]and the value of X is defined as in Table 9.1.2.1-1, and

- $K_{intra} = 1 / X * 100$.
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.1.

Table 9.1.2.1-1: Value of parameter X for EN-DC measurement gap sharing

measGapSharingScheme	Value of X (%)			
'00'	Equal splitting			
'01'	25			
'10'	50			
'11'	75			
which measurement the table to be ap MeasGapSharing	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.			

9.1.2.1a SA: Measurement Gap Sharing

For NR standalone UE without NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers

or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2] and the value of X is defined as in Table 9.1.2.1a-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100$,

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.2.

Table 9.1.2.1a-1: Value of parameter X for NR standalone measurement gap sharing

measGapSharingScheme	Value of X (%)	
'00'	Equal splitting	
'01'	25	
'10'	50	
'11'	75	
which measurement the table <i>to be ap</i>	Scheme is absent and	

9.1.2.1b NE-DC: Measurement Gap Sharing

For NR-E-UTRA dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2][16] and the value of X is defined as in Table 9.1.2.1b-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.x.

Table 9.1.2.1b-1: Value of parameter X for NE-DC measurement gap sharing

measGapSharingScheme	Value of X (%)		
'00'	Equal splitting		
'01'	25		
'10'	50		
'11'	75		
which measureme the table <i>to be ap</i> <i>MeasGapSharing</i>	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1c NR-DC: Measurement Gap Sharing

For UE with NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2] and the value of X is defined as in Table 9.1.2.1c-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.x.

Table 9.1.2.1c-1: Value of parameter X for NR-DC measurement gap sharing

measGapSharingConfig	Value of X (%)				
'00'	Equal splitting				
'01'	25				
'10'	50				
'11'	75				
which measuren the table <i>to be a</i> <i>MeasGapSharin</i>	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.				

9.1.3 UE Measurement capability

9.1.3.1 EN-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the EN-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN, inter-RAT NR, GSM, UTRA FDD and UTRA TDD carriers as configured by E-UTRA PCell, and inter-frequency NR carriers as configured by PSCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, etc.) of detected cells on all the layers.

For UE configured with the EN-DC operation, the effective total number of frequencies excluding the frequencies of the PSCell, SCells, E-UTRA PCell, and E-UTRA SCells being monitored is N_{freq, EN-DC}, which is defined as:

 $N_{\text{freq, EN-DC}} = N_{\text{freq, EN-DC, NR}} + N_{\text{freq, EN-DC, E-UTRA}} + N_{\text{freq, EN-DC, UTRA}} + M_{\text{EN-DC, GSM}}$

where

N_{freq, EN-DC, E-UTRA} is the number of E-UTRA inter-frequency carriers being monitored (FDD and TDD) as configured by E-UTRA PCell or via LPP [22],

 $N_{\text{freq, EN-DC, NR}} \leq N_{\text{freq, EN-DC, NR, inter-RAT}} + N_{\text{freq, EN-DC, NR, inter-freq}}$

where

N_{freq, EN-DC, NR, inter-RAT} is the number of NR inter-RAT carriers excluding NR serving carrier(s) being monitored as configured by E-UTRA PCell [15],

 $N_{\text{freq, EN-DC, NR, inter-freq}}$ is the number of NR inter-frequency carriers being monitored as configured by PSCell,

 $N_{\text{freq, EN-DC, UTRA}}$ is the number of UTRA inter-RAT carriers being monitored as configured by E-UTRA PCell (FDD and TDD).

 $M_{EN-DC, GSM}$ is an integer which is a function of the number of GSM inter-RAT carriers as configured by E-UTRA PCell on which measurements are being performed. $M_{EN-DC, GSM}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{EN-DC, GSM}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{EN-DC, GSM}$ is equal to ceil($N_{carriers,GSM}$ /20) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

9.1.3.1a SA: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with SA NR operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) is configured by PCell, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRA

For UE configured with the NR SA operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{\text{freq, SA}}$, which is defined as:

 $N_{\text{freq, SA}} = N_{\text{freq, SA, NR}} + N_{\text{freq, SA, E-UTRA}},$

where

 $N_{\text{freq, SA, E-UTRA}}$ is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22],

 $N_{\text{freq, SA, NR}}$ is the number of NR inter-frequency carriers being monitored as configured by PCell.

9.1.3.1b NE-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by E-UTRA PSCell, inter-RAT E-UTRAN carriers as configured by PCell, and inter-frequency NR carriers as configured by PCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, and E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NE-DC operation, the effective total number of frequencies excluding the frequencies of the PCell, SCells, E-UTRA PSCell, and E-UTRA SCells being monitored is N_{freq, NE-DC}, which is defined as:

 $N_{\text{freq, NE-DC}} = N_{\text{freq, NE-DC, NR}} + N_{\text{freq, NE-DC, E-UTRA}}$

where

N_{freq, NE-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell,

 $N_{\text{freq, NE-DC, E-UTRA}} \leq N_{\text{freq, NE-DC, E-UTRA, inter-RAT}} + N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$

where

N_{freq, NE-DC, E-UTRA, inter-RAT} is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by PCell or via LPP [22],

 $N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$ is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by E-UTRA PSCell [15] or via LPP [22].

9.1.3.1c NR-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with NR-DC operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) as configured by PCell, and inter-frequency NR carriers as configured by PSCell is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR-DC operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{\text{freq, NR-DC}}$, which is defined as:

 $N_{\text{freq, NR-DC}} = N_{\text{freq, NR-DC, NR}} + N_{\text{freq, NR-DC, E-UTRA}},$

where

 $N_{\text{freq, NR-DC, E-UTRA}}$ is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22].

N_{freq, NR-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell and PSCell.

9.1.3.2 EN-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with EN-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PScell, and
- Depending on UE capability, 7 NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 3 FDD UTRA carriers, and

- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD and GSM (one GSM layer corresponds to 32 carriers) layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), comprising of any above defined combination of NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell and NR inter-frequency carriers configured by PSCell.

When the E-UTRA PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in synchronous intra-band EN-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

Note 1: The E-UTRA-NR dual connectivity capable UE configured with PSCell shall fulfil the requirements defined in only one of clause 9.1.3.2 and clause 8.1.2.1.1b.1 of TS 36.133 [15].

9.1.3.2a SA: Maximum allowed layers for multiple monitoring

If a UE is configured with SA NR operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least [13] effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers.

9.1.3.2b NE-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NE-DC operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA FDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PSCell [15], and

- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 6 effective E-UTRA carrier frequency layers, excluding E-UTRA serving carrier(s), comprising of any above defined combination of E-UTRA inter-RAT carriers excluding E-UTRA serving carrier(s) configured by PCell and E-UTRA inter-frequency carriers configured by E-UTRA PSCell.

9.1.3.2c NR-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NR-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least [13] effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least [7] effective NR carrier frequency layers excluding NR serving carrier(s), which are configured by PCell and PSCell.

When PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in NR-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

9.1.4 Capabilities for Support of Event Triggering and Reporting Criteria

9.1.4.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 9.1.4.2, the UE shall meet all other performance requirements defined in clause 9 and clause 10.

The UE can be requested to make measurements under different measurement identities defined in TS 38.331 [2]. Each measurement identity corresponds to either event based reporting, periodic reporting, or no reporting. In case of event based reporting, each measurement identity is associated with an event triggering criterion. In case of periodic reporting, a measurement identity is associated with one periodic reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event triggering, periodic, and no reporting criteria the UE may be requested to track in parallel.

9.1.4.2 Requirements

In this clause a reporting criterion corresponds to either one event (in the case of event based reporting), or one periodic reporting criterion (in case of periodic reporting), or one no reporting criterion (in case of no reporting). For event based reporting, each instance of event, with the same or different event identities, is counted as separate reporting criterion in Table 9.1.4.2-1.

The UE shall be able to support in parallel per category up to E_{cat} reporting criteria according to Table 9.1.4.2-1. For the measurement categories belonging to intra-frequency, inter-frequency, and inter-RAT measurements (i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the total number of reporting criteria as follows:

- For UE configured with EN-DC: $E_{cat.EN-DC.NR} + E_{cat.EN-DC.E-UTRA}$, where

 $E_{cat,EN-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria configured by PSCell and E-UTRA PCell applicable for UE configured with EN-DC according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PSCell and SCells carrier frequencies,

 $E_{cat,EN-DC,E-UTRA}$ is the total number of E-UTRA reporting criteria configured by E-UTRA PCell except PSCell and SCells carrier frequencies, as specified in TS 36.133 [15] for UE configured with EN-DC.

- For UE configured with NE-DC: $E_{cat,NE-DC,NR} + E_{cat,NE-DC,E-UTRA}$, where

 $E_{cat,NE-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell and SCells carrier frequencies,

 $E_{cat,NE-DC,E-UTRA} = E_{cat,NE-DC,E-UTRA,inter-RAT} + E_{cat,NE-DC,E-UTRA,intra-RAT}$, where

 $E_{cat,NE-DC,E-UTRA,inter-RAT}$ is the total number of inter-RAT E-UTRA reporting criteria configured by PCell except E-UTRA PSCell and E-UTRA SCells carrier frequencies, according to Table 9.1.4.2-1,

 $E_{cat,NE-DC,E-UTRA,intra-RAT}$ is the total number of E-UTRA reporting criteria including E-UTRA PSCell and E-UTRA SCells carrier frequencies as specified in TS 36.133 [15] for UE configured with NE-DC.

- For UE configured with SA operation mode: $E_{cat,SA,NR} + E_{cat,SA,E-UTRA}$, where

 $E_{cat,SA,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

 $E_{cat.SA.E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

- For UE configured with NR-DC: $E_{cat,NR-DC,NR} + E_{cat,NR-DC,E-UTRA}$, where

 $E_{cat,NR-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, PSCell and SCells carrier frequencies,

 $E_{cat,NR-DC,E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

Table 9.1.4.2-1: Requirements for reporting criteria per measurement category

Measurement category	Ecat	Note			
Intra-frequency Note 1,2,3,4,5	9	Events for any one or a combination of intra- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN intra-frequency cells			
Inter-frequency Note 2,3,4,5	10	Events for any one or a combination of inter- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN inter-frequency cells			
Inter-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5	10	Only applicable for UE with this (inter-RAT) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.			
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSTD Note 2,4,5	1	Inter-RAT RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 inter-RAT cell measurements. Only applicable for UE with this (inter-RAT RSTD via LPP [22]) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.			
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSRP and RSRQ measurements for E-CID Note 2,4,5	1	Inter-RAT RSRP and RSRQ measurements for E-CID reported to E-SMLC via LPP [22]. One report capable of at least in total 10 inter-RAT RSRP and RSRQ measurements. Applicable to UE capable of reporting inter-RAT RSRP and RSRQ to E-SMLC via LPP. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.			
NOTE 1: When the UE is configured with PSCell and SCell carrier frequencies, E _{cat} for Intra-frequency is applied per corresponding NR serving frequency. NOTE 2: Applicable for UE configured with SA NR operation mode. NOTE 3: Applicable for UE configured with EN-DC operation mode. NOTE 4: Applicable for UE configured with NE-DC operation mode.					

9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.3 and 9.4 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSF_{outside_gap,i} and CSSF_{within_gap,i}, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

9.1.5.1 Monitoring of multiple layers outside gaps

NOTE 5: Applicable for UE configured with NR-DC operation mode.

The carrier-specific scaling factor $CSSF_{outside_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement with no measurement gap in clause 9.2.5, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with no measurement gap in clause 9.2.5, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

UE is expected to conduct the measurement of this measurement object *i* only outside the measurement gaps.

If the higher layer signaling in TS 38.331 [2] signaling of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{outside_gap,i} and requirements derivied from CSSF_{outside_gap,i} are not specified.

The UE cell identification and measurement periods derived based on $CSSF_{outside_gap,i}$ in clauses 9.2.5.1, 9.2.5.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{measure}$ specified in clause 9.3.8 when no measurement gaps are provided.

9.1.5.1.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with the E-UTRA-NR dual connectivity operation, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.1-1.

Table 9.1.5.1.1-1: CSSF_{outside_gap,i} scaling factor for EN-DC mode

Scenario	CSSF _{outside_ga} _{p,i} for FR1 PSCC	CSSF _{outside_gap} , i for FR1 SCC	CSSF _{outside_gap,} i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required Note 2	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
EN-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
EN-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCells
EN-DC with FR1 +FR2 CA (FR1 PSCell) Note	1	2×(Number of configured SCell(s)-1)	N/A	2	2×(Number of configured SCell(s)-1)
EN-DC with FR1 +FR2 CA (FR2 PSCell) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

Note 1: Only one NR FR1 operating band and one NR FR2 operating band are included for FR1+FR2 inter-band EN-DC. Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

9.1.5.1.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE in SA operation mode, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.2-1, which shall also be applied for a UE configured with NE-DC operation.

Table 9.1.5.1.2-1: CSSF_{outside gap,i} scaling factor for SA mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} ,i for FR1 SCC	CSSF _{outside_ga} _{p,i} for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2	2x(Number of configured SCell(s)-1)

Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA. Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

9.1.5.1.3 NR-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NR-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.3-1.

Table 9.1.5.1.3-1: CSSF_{outside_gap,i} scaling factor for NR-DC mode

Scenario	CSSF _{outside_gap} ,i for FR1 PCC	CSSF _{outside_gap,i} for FR1 SCC	CSSFoutside_gap,i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 + FR2 NR- DC (FR1 PCell and FR2 PScell)	1	2x(Number of configured SCell(s))	2	2×(Number of configured SCell(s))
Note 1: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.				

9.1.5.1.4 NE-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NE-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.4-1.

Table 9.1.5.1.4-1: CSSF_{outside gap,i} scaling factor for NE-DC mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} , for FR1 SCC	CSSF _{outside_ga} _{p,i} for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
NE-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
NE-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
NE-DC with FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2	2x(Number of configured SCell(s)-1)

Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA. Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor $CSSF_{within_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement object with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement object with measurement gap in clause 9.2.6.
- Inter-frequency measurement object in clause 9.3.
- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.
- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.
- NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4).
- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).

- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).
- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).
- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] signaling of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{within_gap,i} and requirements derivied from CSSF_{outside_gap,i} are not specified.

9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

Editor's note: The scaling value CSSF_{within_gap,i} below has been derived without considering GSM inter-RAT carriers.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, $CSSF_{within_gap,i}$ =1. Otherwise, the $CSSF_{within_gap,i}$ for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*
- An inter-RAT measurement object configured by PSCell is a candidate to be measured in all measurement gaps.
- An inter-RAT UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

- $M_{intra,i,j}$: Number of intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.
- $M_{inter,i,j}$: Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{inter,i,j}$ equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, $CSSF_{within_gap,i} = max(ceil(R_i \times M_{tot,i,j}))$, where j = 0...(160/MGRP) - 1

If measGapSharingScheme is not equal sharing and

- measurement object i is an intra-frequency measurement object, CSSF_{within gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{intra,i,j})$ in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,i})$ in gaps where $M_{inter,i,i}=0$, where j=0...(160/MGRP)-1
- measurement object i is an inter-frequency or inter-RAT measurement object, $CSSF_{within_gap,i}$ is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{inter,i,j})$ in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1

Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.5.2.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this clause.

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

 $M_{intra,i,j}$: Number of intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.

 $M_{inter,i,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{inter,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is an intra-frequency measurement object, $CSSF_{within\ gap,i}$ is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{intra,i,j})$ in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{inter,i,j})$ in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1

Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

 $CSSF_{within_gap,k}=1$ during $T_{Detect, E-UTRAN FDD}$ specified in clause 9.4.4.1.2.2 and $T_{Detect, E-UTRAN TDD}$ specified in clause 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on $CSSF_{within_gap,i}$ in clauses 9.2.5.1, 9.2.5.2, 9.2.6.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{Detect, E-UTRAN FDD}$ and $T_{Detect, E-UTRAN TDD}$.

9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this clause.

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

If the number of configured inter-frequency and inter-RAT measuerement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intra-frequency measurement objects belong to group A

Inter-frequency and inter-RAT measurement objects belong to group B

 $M_{groupA,i,j}$: Sum of the number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

If the number of configured inter-frequency and inter-RAT measuerement objects is zero and the UE is configured with per UE gaps:

FR1 intra-frequency measurement objects belong to group A

FR2 intra-frequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

 $M_{\text{tot},i,j} = M_{\text{groupA},i,j} + M_{\text{groupB},i,j}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot},i,j}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= max(ceil(R_i×M_{tot,i,j})), where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is a group A measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{groupA,i,j}$) in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object i is an group B measurement object, CSSF_{within gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1

Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and inter-frequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the

value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

If the number of configured inter-frequency and inter-RAT measuerement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intra-frequency measurement objects belong to group A

Inter-frequency and inter-RAT measurement objects belong to group B

 $M_{groupA,i,j}$: Sum of the number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intra-frequency measurement objects belong to group A

FR2 intra-frequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is a group A measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object i is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1
- R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.6 Minimum requirement at transitions

When the measurement on one intra-frequency measurement object transitions from measurements performed outside gaps to measurements performed within gaps or vice versa during one measurement period, the cell identification and measurement period requirements with the longer delay apply.

The carrier-specific scaling factor specified in clause 9.1.5 that applies to the other impacted measurement objects will also apply based on the longer measurement or cell identification delay before or after the transition.

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, the cell identification and measurement period requirements apply based on the longer delay before or after the transition.

Subsequent to this measurement period, the cell identification and measurement period requirements on each measurement object are corresponding to the second mode after transition.

9.2 NR intra-frequency measurements

9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

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

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE, or
- the active downlink BWP is initial BWP[3].

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB which start earlier than the gap starting time + switching time, nor detect SSB which end later than the gap end - switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

9.2.2 Requirements applicability

The requirements in clause 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,

- SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

9.2.3 Number of cells and number of SSB

9.2.3.1 Requirements for FR1

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 8 identified cells, and
- 14 SSBs with different SSB index and/or PCI on the intra-frequency layer, where the number of SSBs in the serving cell (except for the SCell) is not smaller than the number of configured RLM-RS SSB resources.

9.2.3.2 Requirements for FR2

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 6 identified cells, and
- 24 SSBs with different SSB index and/or PCI,

where the single serving carrier shall be:

- PCC when UE is configured with SA NR operation mode with PCC in the band; or
- PSCC when UE is configured with EN-DC with PSCC in the band; or
- One of the SCCs on which UE is configured to report SSB based measurements when neither PCC nor PSCC is
 in the same band, so that the selected SCC shall be an SCC where the UE is configured with SS-RSRP
 measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other serving carrier(s) in the same band.

9.2.4 Measurement Reporting Requirements

9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

9.2.4.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.2.4.3.

9.2.4.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The UE shall not send any event triggered measurement reports as long as no reporting criteria is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{identify\ intra\ with\ index}$ or T $_{identify\ intra\ without\ index}$ defined in clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSBs measured from the Cell being configured remains detectable during the time period T $_{identify_intra_with_index}$ or T $_{identify_intra_with_index}$ as defined in clause 9.2.5.1 or clause 9.2.6.2. If a cell which has been detectable at least for the time period T $_{identify_intra_with_out_index}$ or T $_{identify_intra_with_index}$ defined in clause 9.2.5.1 or clause 9.2.6.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and triggers an event, the event triggered measurement reporting delay shall be less than TSSB_measurement_period_intra_provided the timing to that cell has not changed more than \pm 3200 Tc while the measurement gap has not been available and L3 filtering has not been used. When L3 filtering is used, an additional delay can be expected.

9.2.5 Intrafrequency measurements without measurement gaps

9.2.5.1 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_with_index}. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T_{identify_intra_without_index}. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra}) \ ms$$

$$T_{identify_intra_with_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}) \ ms$$

Where:

T_{PSS/SSS_sync_intra}: it is the time period used in PSS/SSS detection given in table 9.2.5.1-1, 9.2.5.1-2, 9.2.5.1-4 (deactivated Scell) or 9.2.5.1-5 (deactivated SCell)

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.5.1-3 or 9.2.5.1-6 (deactivated SCell)

T_{SSB_measurement_period_intra}: equal to a measurement period of SSB based measurement given in table 9.2.5.2-1, table 9.2.5.2-2 table 9.2.5.2-3 (deactivated Scell) or 9.2.5.2-4(deactivated SCell)

CSSF_{intra}: it is a carrier specific scaling factor and is determined

according to $CSSF_{outside_gap,i}$ in clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intrafrequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intrafrequency SMTC is fully overlapping with measurement gaps.

if the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss_sync_w/o_gaps}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_w/o_gaps}$ =40. For a UE supporting power class 2, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_w/o_gaps}$ =24.

 $M_{meas_period_w/o_gaps}$: For a UE supporting power class 1, $M_{meas_period_w/o_gaps}$ =40. For a UE supporting FR2 power class 2, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_w/o_gaps}$ =24.

When intrafrequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs, Kp=1

When intrafrequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1-(SMTC period/MGRP)), where SMTC period < MGRP

If the higher layer signaling in TS38.331 [2] signalling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$

For FR2.

 $K_{layer1_measurement}=1$,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or
- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;

K_{layer1 measurement}=1.5, otherwise.

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra		
No DRX	max(600ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x		
	CSSF _{intra}		
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5 x K _p) x max(SMTC		
•	period,DRX cycle)) x CSSF _{intra}		
DRX cycle>320ms	ceil(5] x K _p) x DRX cycle x CSSF _{intra}		
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is			
the one used by the cell being identified			

Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

DRX cycle	TPSS/SSS_sync_intra	
No DRX	max(600ms, ceil(M _{pss/sss_sync_w/o_gaps} x K _p x	
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}	
DRX cycle≤ 320ms	max(600ms, ceil(1.5 x M _{pss/sss_sync_w/o_gaps} x K _p x	
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x	
	CSSF _{intra}	
DRX cycle>320ms	ceil(Mpss/sss_sync_w/o_gaps x Kp x Klayer1_measurement) x DRX	
	cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is		
the one used by the cell being identified		

Table 9.2.5.1-3: Time period for time index detection (Frequency range FR1)

DRX cycle	T _{SSB_time_index_intra}	
No DRX	max(120ms, ceil(3 x K _p) x SMTC period) ^{Note 1} x	
	CSSF _{intra}	
DRX cycle≤ 320ms	max(120ms, ceil (1.5 x 3 x K _p) x max(SMTC	
·	period,DRX cycle)) x CSSF _{intra}	
DRX cycle>320ms	Ceil(3 x K _p) x DRX cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is		
the one used by the cell being identified		

Table 9.2.5.1-4: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	5 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR2)

DRX cycle	Tpss/sss_sync_intra
No DRX	Mpss/sss_sync_w/o_gaps x measCycleSCell x CSSFintra
DRX cycle≤ 320ms	M _{pss/sss_sync_w/o_gaps} x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	M _{pss/sss_sync_w/o_gaps} x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-6: Time period for time index detection, deactivated SCell (Frequency range FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	3 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	3 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	3 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement and smtc2 is partially overlapping with measurement gaps, requirements are not specified for T_{SSB_measurement_period_intra}

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.2-1: Measurement period for intrafrequency measurements without gaps(Frequency FR1)

DRX cycle	T SSB_measurement_period_intra		
No DRX	max(200ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x		
	CSSF _{intra}		
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5 x K _p) x max(SMTC period,DRX		
•	cycle)) x CSSF _{intra}		
DRX cycle>320ms	ceil(5 x K _p) x DRX cycle x CSSF _{intra}		
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is			
the one used by the cell being identified			

Table 9.2.5.2-2: Measurement period for intrafrequency measurements without gaps(Frequency FR2)

DRX cycle	T SSB_measurement_period_intra	
No DRX	max(400ms, ceil(M _{meas_period_w/o_gaps} x K _p x	
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}	
DRX cycle≤ 320ms	max(400ms, ceil(1.5x M _{meas_period_w/o_gaps} x K _p x	
·	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x	
	CSSFintra	
DRX cycle>320ms	ceil(M _{meas_period_w/o_qaps} xK _p x K _{layer1 measurement}) x DRX	
	cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified		

Table 9.2.5.2-3: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR1)

DRX cycle	T ssb_measurement_period_intra
No DRX	5 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.2-4: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	M _{meas_period_w/o_gaps} x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	M _{meas_period_w/o_gaps} x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	M _{meas_period_w/o_gaps} x max(measCycleSCell, DRX cycle) x CSSF _{intra}

9.2.5.3 Scheduling availability of UE during intra-frequency measurements

UE are required to be capable of measuring without measurement gaps when the SSB is completely contained in the active bandwidth part of the UE. When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols to be measured in the following clauses are the SSB symbols indicated by *SSB-ToMeasure* [2], if it is configured; otherwise, all *L* SSB symbols within SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the SMTC periodicity follows *smtc1*.

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRQ measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured(in TS 38.331 [2]), the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.2 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If *deriveSSB_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2* is configured(in TS 38.331 [2]), the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.
- If deriveSSB_IndexFromCell is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of smtc2 is configured(in TS 38.331 [2]), the SMTC periodicity follows smtc2; Otherwise the SMTC periodicity follows smtc1.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling deriveSSB_IndexFromCell is always enabled for FR2) . If the high layer signalling of smtc2 is configured(in TS 38.331 [2]), the SMTC periodicity follows smtc2; Otherwise the SMTC periodicity follows smtc1.

The following scheduling restriction applies to SS-RSRQ measurement on an FR2 intra-frequency cell

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB_IndexFromCellc* is always enabled for FR2). If the high layer signalling of *smtc2* is configured(in TS 38.331 [2]), the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

If following conditions are met:

- The UE has been notified about system information update through paging,
- The gap between the UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, the UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, the UE is expected to receive PDSCH that corresponds to the PDCCH that the UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured.

9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer.

9.2.5.4 SFTD Measurements between PCell and PSCell

9.2.5.4.1 Introduction

This clause contains SFTD measurement requirements for UE which supports NR-DC and is configured with a PSCell in RRC_CONNECTED state. The UE shall perform SFTD measurement between PCell and PSCell, and report the SFTD result with/without SS-RSRP after the network requests with *reportType* for the associated *reportConfig* set to *reportSFTD*. The overall delay includes RRC procedure delay to be defined in clause 12 in TS 38.331 [2], and SFTD measurement reporting delay in clause 9.2.5.4.3.

9.2.5.4.2 SFTD Measurement delay

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(200,[5] \text{ x SMTC period})$ ms, where the SMTC period refers to the maximum between the configured SMTC period in PCell and PSCell.

When DRX is used in either of the PCell or the PSCell, or in both PCell and PSCell, the physical layer measurement period (T_{measure_SFTD1}) of the SFTD measurement shall be as specified in Table 9.2.5.4.2-1.

Table 9.2.5.4.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) Note 3	T _{measure_} SFTD1 (S)
≤0.04	max(0.2,[5] x SMTC period) (Note2)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note 1: SMTC period in this table refers to the maximum between the configured SMTC period in PCell and PSCell. Note 2: Number of DRX cycles depends upon the DRX cycle in use DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell.	

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NRDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period (T_{measure SFTD2}), and

T_{PSCell change NRDC} is the time necessary to change the PSCell; it can be up to [25] ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 10.1.21.

9.2.5.4.3 SFTD Measurement Reporting Delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI_{DCCH}. This measurement reporting delay excludes any delay caused by no UL resources available for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than measurement period defined in clause 9.2.5.4.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.2.6 Intrafrequency measurements with measurement gaps

9.2.6.1 Void

9.2.6.2 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_with_index}. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T_{identify_intra_without_index}. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

 $T_{identify_intra_without_index} = T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} \ ms$

 $T_{identify_intra_with_index} = T_{PSS/SSS_sync_ntra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}$

Where:

T_{PSS/SSS sync intra}: it is the time period used in PSS/SSS detection given in table 9.2.6.2-1 or 9.2.6.2-2.

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.6.2-3.

T _{SSB_measurement_period_intra}: equal to a measurement period of SSB based measurement given in table 9.2.6.2-1 or 9.2.6.2-2.

 $CSSF_{intra}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_with_gaps}: For \ a \ UE \ supporting \ FR2 \ power \ class \ 1, \ M_{pss/sss_sync_with_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ supportin$

 $M_{meas_period_with_gaps}$: For a UE supporting power class 1, $M_{meas_period_with_gaps}$ =40. For a UE supporting power class 2, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_with_gaps}$ =24.

If the higher layer signaling in TS 38.331 [2] signaling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$.

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.2-1: Time period for PSS/SSS detection (Frequency range FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	max(600ms, 5 x max(MGRP, SMTC period)) x
	CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5) x max(MGRP, SMTC
,	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-2: Time period for PSS/SSS detection (Frequency range FR2)

DRX cycle	T _{PSS/SSS_sync_intra}
No DRX	max(600ms, M _{pss/sss_sync_with_gaps} x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x M _{pss/sss_sync_with_gaps}) x
	max(MGRP, SMTC period, DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	M _{pss/sss_sync_with_gaps} x max(MGRP, DRX cycle) x
·	CSSF _{intra}

Table 9.2.6.2-3: Time period for time index detection (Frequency range FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	max(120ms, 3 x max(MGRP, SMTC period)) x
	CSSF _{intra}
DRX cycle≤ 320ms	max(120ms, ceil(1.5x 3) x max(MGRP, SMTC
·	period,DRX cycle) x CSSF _{intra})
DRX cycle>320ms	3 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

9.2.6.3 Intrafrequency Measurement Period

The measurement period for FR1 intrafrequency measurements with gaps is as shown in table 9.2.6.3-1.

The measurement period for FR2 intrafrequency measurements with gaps is as shown in table 9.2.6.3-2.

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.3-1: Measurement period for intrafrequency measurements with gaps(Frequency Range FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, 5 x max(MGRP, SMTC period)) x
	CSSF _{intra}
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5) x max(MGRP, SMTC
·	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.3-2: Measurement period for intrafrequency measurements with gaps(Frequency Range FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, M _{meas_period with_gaps} x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(400ms, ceil(1.5 x M _{meas_period with_gaps}) x max(MGRP, SMTC period, DRX cycle)) Note 1 x
	CSSF _{intra}
DRX cycle>320ms	M _{meas_period with_gaps} x max(MGRP, DRX cycle) x
	CSSF _{intra}

9.3 NR inter-frequency measurements

9.3.1 Introduction

A measurement is defined as an SSB based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.2.

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

SSB based measurements are configured along with a measurement timing configuration (SMTC) per carrier, which provides periodicity, duration and offset information on a window of up to 5ms where the measurements on the configured inter-frequency carrier are to be performed. For inter-frequency connected mode measurements, one measurement window periodicity may be configured per inter-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB on an inter-frequency measurement object which starts earlier than the gap starting time + switching time, nor detect SSB which ends later than the gap end – switching time. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

9.3.2 Requirements applicability

The requirements in clause 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

- 9.3.2.1 Void
- 9.3.2.2 Void

9.3.3 Number of cells and number of SSB

9.3.3.1 Requirements for FR1

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 7 SSBs with different SSB index and/or PCI on the inter-frequency layer.

9.3.3.2 Requirements for FR2

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 10 SSBs with different SSB index and/or PCI on the inter-frequency layer, and
- 1 SSB per identified cell.

9.3.4 Inter frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within $T_{identify_inter_without_index}$.

$$T_{identify_inter_without_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter}) \ ms$$

$$T_{identify_inter_with_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter}) \ ms$$

Where:

T_{PSS/SSS sync inter}: it is the time period used in PSS/SSS detection given in table 9.3.4-1 and table 9.3.4-2.

 $T_{SSB_time_index_inter}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3.4-3 and table 9.3.4-4.

 $T_{SSB_measurement_period_inter}$: equal to a measurement period of SSB based measurement given in table 9.3.5-1 and table 9.3.5-2.

 M_{pss/sss_sync_inter} : For a UE supporting FR2 power class 1, M_{pss/sss_sync_inter} = 64 samples. For a UE supporting FR2 power class 2, M_{pss/sss_sync_inter} = 40 samples. For a UE supporting FR2 power class 3, M_{pss/sss_sync_inter} = 40 samples. For a UE supporting FR2 power class 4, M_{pss/sss_sync_inter} = 40 samples.

 $M_{SSB_index_inter}$: For a UE supporting FR2 power class 1, $M_{SSB_index_inter} = 40$ samples. For a UE supporting FR2 power class 2, $M_{SSB_index_inter} = 24$ samples. For a UE supporting FR2 power class 3, $M_{SSB_index_inter} = 24$ samples. For a UE supporting FR2 power class 4, $M_{SSB_index_inter} = 24$ samples.

 $M_{meas_period_inter}$: For a UE supporting FR2 power class 1, $M_{meas_period_inter}$ =64 samples. For a UE supporting FR2 power class 2, $M_{meas_period_inter}$ =40 samples. For a UE supporting FR2 power class 3, $M_{meas_period_inter}$ =40 samples. For a UE supporting FR2 power class 4, $M_{meas_period_inter}$ =40 samples.

CSSF_{inter}: it is a carrier specific scaling factor and is determined according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	TPSS/SSS_sync_inter	
No DRX	$Max(600ms, 8 \times Max(MGRP, SMTC period)) \times CSSF_{inter}$	
DRX cycle ≤ 320ms	Max(600ms, Ceil(8*1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF _{inter}	
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for		
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.		

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

Condition NOTE1,2	TPSS/SSS_sync_inter
No DRX	Max(600ms, M _{pss/sss_sync_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(600ms, (1.5 × M _{pss/sss_sync_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×
	CSSF _{inter}
DRX cycle > 320ms	$M_{pss/sss_sync_inter} \times DRX \ cycle \times CSSF_{inter}$
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	

the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

Condition NOTE1,2	T _{SSB_time_index_inter}	
No DRX	Max(120ms, 3 × Max(MGRP, SMTC period)) × CSSF _{inter}	
DRX cycle ≤ 320ms	$Max(120ms, Ceil(3 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF_{inter}$	
DRX cycle > 320ms	3 × DRX cycle × CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for		
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.		

Table 9.3.4-4: Time period for time index detection (Frequency range FR2)

Condition NOTE1,2	T _{SSB_time_index_inter}
No DRX	Max(200ms, M _{SSB_index_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(200ms, (1.5 × MssB_index_inter) × Max(MGRP, SMTC period, DRX cycle)) ×
	CSSF _{inter}
DRX cycle > 320ms	$M_{SSB_index_inter} \times DRX \ cycle \times CSSF_{inter}$
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.	

9.3.4.1 Void

9.3.4.2 Void

Inter frequency measurements 9.3.5

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-1: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

Condition NOTE1,2	T ssb_measurement_period_inter
No DRX	Max(200ms, 8 × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	$Max(200ms, Ceil(8 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF_{inter}$
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.	

Table 9.3.5-2: Measurement period for inter-frequency measurements with gaps (Frequency FR2)

Condition NOTE1,2	T SSB_measurement_period_inter
No DRX	Max(400ms, M _{meas_period_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(400ms, (1.5 × M _{meas_period_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×
	CSSF _{inter}
DRX cycle > 320ms	M _{meas_period_inter} × DRX cycle × CSSF _{inter}
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.	

9.3.5.1	Void
9.3.5.2	Void
9.3.5.3	Void

9.3.6 NR Inter frequency measurements reporting requirements

9.3.6.1 Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

9.3.6.2 Event-triggered Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.3.6.3.

9.3.6.3 Event-triggered Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall

be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. Both $T_{identify_inter_without_index}$ and $T_{identify_inter_with_index}$ are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSB measured from the cell being configured remains detectable during the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4. If a cell which has been detectable at least for the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_inter}$ defined in clause 9.3.5 provided the timing to that cell has not changed more than \pm 3200 Tc while measurement gap has not been available and the L3 filtering has not been used. When L3 filtering is used an additional delay can be expected.

9.3.7 Void

9.3.8 NR Inter frequency SFTD measurement requirements

9.3.8.1 Introduction

This clause contains requirements for a UE supporting NR inter-frequency SFTD measurement and is applicable in RRC_CONNECTED state. The UE shall, depending on network request, perform inter-frequency SFTD measurement and report SFTD result with or without SS-RSRP. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2] and SFTD measurement reporting delay in clause 9.3.8.3.

UE which fulfils the requirements in clause 9.3.8 is not supposed to fulfil the requirements defined in clause 9.2.5.4.

9.3.8.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this clause are applicable under the side condition SCH $\hat{E}s/Iot \ge -3$ dB for the inter-frequency neighbour cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest applicable inter-frequency neighbour cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more strongest cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell regardless of its SSB position in the SMTC period, provided that the carrier frequency where SFTD measurement is configured and the serving carrier(s) form a supported CA or NR-DC band combination of the UE. The SFTD measurement shall be conducted with sustained connection to the PCell and activated SCell(s) in MCG. Depending on capability, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 8.2.2.2.6.

When measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure_SFTD1}$ as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 14 SMTC periods
 - For carrier frequency in FR2: $T_{measure SFTD1} = 112 SMTC$ periods
- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = CSSF_{inter} × 8 × Max(MGRP, SMTC period)

- For carrier frequency in FR2: $T_{measure_SFTD1} = CSSF_{inter} \times 64 \times Max(MGRP, SMTC period)$
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure SFTD1} = 19 SMTC periods
 - For carrier frequency in FR2: $T_{measure SFTD1} = 152 \text{ SMTC}$ periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure SFTD1} = CSSF_{inter} × 13 × Max(MGRP, SMTC period)
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 104 × Max(MGRP, SMTC period)

where CSSF_{inter} is a carrier specific scaling factor and is determined according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps.

When DRX is used, the same $T_{measure_SFTD1}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case PCell is changed due to handover, the UE shall terminate the inter-frequency SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfil the requirement in clause 10.1.21.3. The measurement accuracy for additionally reported SS-RSRP shall fulfil the requirement in clauses 10.1.4.1 and 10.1.5.1 for neighbour cell in FR1 and FR2, respectively.

9.3.8.3 SFTD Measurement reporting delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface, excluding the RRC procedure delay defined in TS 38.331 [2]. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of 2 \times TTI_{DCCH} resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than T_{measure SFTD1} defined in clause 9.3.8.2.

9.4 Inter-RAT measurements

9.4.1 Introduction

The requirements in this clause are specified for NR–E-UTRAN FDD and NR–E-UTRAN TDD measurements and are applicable without an explicit E-UTRAN neighbour cell list containing physical layer cell identities, for a UE:

- in RRC_CONNECTED state, and
- configured with SA or NR-DC operation mode or configured in NE-DC operation mode by PCell with NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) on E-UTRA non-serving frequency carrier, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements specified in clause 8.19 of TS 36.133 [15] shall apply.

Parameter T_{Inter1} used in inter-RAT requirements in clause 9.4 is specified in Table 9.4.1-1.

Table 9.4.1-1: Minimum available	time for inter-RAT	measurements

Gap Pattern Id	MeasurementGap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)	Minimum available time for inter- frequency and inter- RAT measurements during 480 ms period (Tinter1, ms)
0	6	40	60
1	6	80	30
2	3	40	24 ^{Note 1}
3	3	80	12 ^{Note 1}
4	6	20	120 Note 1
6	4	20	72 Note 1,3,6
7	4	40	36 Note 1,4,6
8	4	80	18 ^{Note 1,5,6}
10	3	20	48 Note 1
NOTE 1: When determing UE requirements using Tinter1 for gap pattern IDs 2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for gap pattern IDs 2, 4, 6, 7, 10, and Tinter1 = 30 for gap pattern IDs 3 and 8 shall be used.			

- NOTE 2: Measurement gaps pattern configurations applicability is as specified in Table 9.1.2-1.
- NOTE 3: When this gap pattern is used, the Tinter for E-UTRA inter-frequency measurements is 48 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 4: When this gap pattern is used, the Tinter for E-UTRA inter-frequency measurements is 24 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 5: When this gap pattern is used, the Tinter for E-UTRA inter-frequency measurements is 12 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 6: This gap pattern is applicable for E-UTRA inter-frequency measurements only if gap based NR measurements are also configured.

A UE configured with gap pattern ID 2, 3 or 10 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 µs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends not later than 500 µs before the end of the measurement gap in case of FDD and not later than 750 µs before the end of measurement gap in case of TDD.

A UE configured with gap pattern ID 6, 7 or 8 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 µs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends no later than 1500 µs before the end of the measurement gap in case of FDD and no later than 1750 µs before the end of measurement gap in case of TDD.

9.4.2 NR – E-UTRAN FDD measurements

9.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN FDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.2.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable FDD cell within T_{Identify, E-UTRAN FDD} according to the following expression:

$$T_{\rm Identify,E-UTRAN\;FDD} = T_{\rm Basic Identify} \cdot \frac{480}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} \ ms,$$

where:

 $T_{\text{BasicIdentify}} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{\text{Measure, E-UTRAN FDD}}$ defined in Table 9.4.2.2-1.

Table 9.4.2.2-1: Measurement period and measurement bandwidth

Configuration	Physical Layer Measurement period: TMeasure, E-UTRAN FDD [ms]	Measurement bandwidth [RB]
0	480 x CSSF _{interRAT}	6
1 (Note 1)	240 x CSSF _{interRAT}	50
NOTE 1: This co	nfiguration is optional.	

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN FDD cell within T_{Identify, E-UTRAN FDD} specified in Table 9.4.2.3-1.

Table 9.4.2.3-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (S) (DRX cycles)		
	Gap period = 40 ms, 20 ms	Gap period = 80 ms	
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.2.2 apply	clause 9.4.2.2 apply	
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSF _{interRAT})	(30*CSSF _{interRAT})	
0.32	6.4* CSSF _{interRAT}	7.68* CSSF _{interRAT}	
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})	
0.32< DRX-cycle ≤	Note1 (20*CSSFinterRAT)	Note1 (20*CSSFinterRAT)	
10.24			
NOTE 1: The time depends on the DRX cycle length.			

NOTE 2: CSSF_{interRAT} is as defined in clause 9.4.2.2.

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers, and the UE physical layer shall be capable of

reporting NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN FDD}$ specified in Table 9.4.2.3-2.

Table 9.4.2.3-2: Requirement to measure E-UTRAN FDD cells

DRX cycle length (s)	T _{measure} , E-UTRAN FDD (s) (DRX cycles)	
≤0.08	Non-DRX requirements in clause 9.4.2.2 apply	
0.08< DRX-cycle ≤10.24	Note1 (5* CSSF _{interRAT})	
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.2.2.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN FDD RSRO measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.4 Measurement reporting requirements

9.4.2.4.1 Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.2.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.2.4.3.

9.4.2.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{Identify, E-UTRAN \, FDD}$ defined in clauses 9.4.2.2 and 9.4.2.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify,\,E-UTRAN\,FDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure,\,E-UTRAN\,FDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

NR - E-UTRAN TDD measurements 9.4.3

9.4.3.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN TDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],

RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.3.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable TDD cell within T_{Identify, E-UTRAN TDD} according to the following expression:

When configuration 0 or configuration 1 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\;TDD} = T_{\rm Basic Identify} \cdot \frac{480}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} ~ms,$$

When configuration 2 or configuration 3 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\,TDD} = T_{\rm BasicIdentify} \cdot \frac{_{480}}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} + 240 \cdot {\rm CSSF}_{\rm interRAT} \hspace{0.5cm} ms,$$

where:

 $T_{\text{BasicIdentify}} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier i which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measure, E-UTRAN TDD}$ defined in Table 9.4.3.2-1.

Table 9.4.3.2-1: T_{Measure, E-UTRAN TDD} for different configurations

Configuration	Measurement bandwidth		UL/DL sub- If frame (5 ms)	Dwl	PTS	T _{Measure} , E-UTRAN TDD (ms)
	(RB)	DL	UL	Normal CP	Extende d CP	
0	6	2	2	$19760 \cdot T_{\rm s}$	20480· <i>T</i> _s	480 x CSSF _{interRAT}
1 (Note 1)	50	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	240 x CSSF _{interRAT}
2	6	1	3	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	720 x CSSF _{interRAT}
3 (Note 1)	50	1	3	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	480 x CSSF _{interRAT}

NOTE 1: This configuration is optional. NOTE 2: Void

The UE shall be capable of identifying and performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN TDD cell within $T_{Identify, E-UTRAN \, TDD}$ specified in Table 9.4.3.3-1.

Table 9.4.3.3-1: Requirement to identify a newly detectable E-UTRAN TDD cell

DRX cycle length (s)	Tidentify, E-UTRAN TDD (s) (DRX cycles)		
	Gap period = 40 ms, 20	Gap period = 80 ms	
	ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.3.2 apply	clause 9.4.3.2 apply	
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSF _{interRAT})	(30*CSSF _{interRAT})	
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})	
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSF _{interRAT})	
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.3.2.			

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN TDD}$ specified in Table 9.4.3.3-2.

Table 9.4.3.3-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN TDD (s) (DRX cycles)		
≤0.08	Non-DRX Requirements in clause 9.4.3.2 apply		
0.128	For configuration 2 Note3, non-DRX requirements		
	in clause 9.4.3.2 apply,		
	Otherwise: Note1 (5*CSSF _{interRAT})		
0.128 <drx-cycle≤< td=""><td>Note1 (5*CSSF_{interRAT})</td></drx-cycle≤<>	Note1 (5*CSSF _{interRAT})		
10.24			
NOTE 1: The time deper	pends on the DRX cycle length.		
NOTE 2: CSSFinterRAT is	s as defined in clause 9.4.3.2.		
NOTE 3: See Table 9.4.3	.3.2-1.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.4 Measurement reporting requirements

9.4.3.4.1 Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.3.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.3.4.3.

9.4.3.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{Identify, E-UTRAN \, TDD}$ defined in clauses 9.4.3.2 and 9.4.3.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify,\,E-UTRAN\,TDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure,\,E-UTRAN\,TDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.4 Inter-RAT RSTD measurements

9.4.4.1 NR – E-UTRAN FDD RSTD measurements

9.4.4.1.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSTD measurements requested via LPP [22, 27].

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ starts.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ time period starts while meeting all the requirements in

clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ starts.

9.4.4.1.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT E-UTRAN FDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{RSTD InterRAT, E-UTRAN FDD}$ ms as given below:

$$T_{RSTD\ InterRAT.\ E-UTRAN\ FDD} = T_{PRS} \cdot (M-1) + \Delta$$
 ms,

where

 $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ is the total time for detecting and measuring at least n cells,

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.1.2-1, where each PRS positioning occasion comprises of N_{PRS} (1 \leq N_{PRS} \leq 6) consecutive downlink positioning subframes defined in TS 36.211 [23],

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN FDD carrier frequencies.

Table 9.4.4.1.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$

Positioning subframe	Number of PRS positioning occasions ${\it M}$		
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2	
160 ms	16 × CSSF _{interRAT}	32 × CSSF _{interRAT}	
>160 ms	8 × CSSF _{interRAT}	16 × CSSF _{interRAT}	
NOTE 1: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell			
and neighbour cells, which belong to the E-UTRAN FDD carrier frequency f2.			
NOTE 2: When inter-RAT E-UT	nter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell		

and the neighbour cells, which belong to the E-UTRAN FDD carrier frequency f1 and the E-

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{RSTD\ InterRAT\ E-UTRAN\ FDD}$ provided:

UTRAN FDD carrier frequency f2 respectively.

 $(PRS \hat{E}_s / Iot)_{ref} \ge -6 dB$ for all Frequency Bands for the reference cell,

 $(PRS \hat{E}_s / Iot)_{i \ge -13}$ dB for all Frequency Bands for neighbour cell *i*,

 $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref}$ and $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i}$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning

occasions.

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

 $PRS\,\hat{E}_s$ / Iot is defined as the ratio of the average received energy per PRS resource element during the useful part of the symbol to the average received power spectral density of the total noise and interference for this resource element, where the ratio is measured over all resource elements which carry PRS.

The time $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.1.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.1.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN FDD} + T_{MIB} + T_{ECGI}$$

where

 $T_{Detect, E-UTRAN \, FDD} = T_{Identify, E-UTRAN \, FDD}$ - $T_{measure, E-UTRAN \, FDD}$ is according to clause 9.4.2 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \, FDD}=0$ when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver (T_{MIB} =0 when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.2.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{\text{RefCell,E-UTRAN}}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-1. When $T_{ECGI}>0$ and UE is using autonomous gaps during T_{ECGI} , the UE shall transmit at least $N_{ACK/NACK, ECGI, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-2. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE

is using autonomous gaps during T_{MIB}+T_{ECGI}, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK,NACK,\;MIB+ECGI,\;FDD}$ ACK/NACKs specified in Table 9.4.4.1.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.1.2.2-1, 9.4.4.1.2.2-2, and 9.4.4.1.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.1.2.2-1: Number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, fdd	Configuration of the serving cell in white are counted	
	Duplex mode configuration	SCS
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz
NOTE 1: TDD UL-DL config	uration is as specified in Table A.3.3.1-1 of TS	38.101-1 [18].

NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.1.2.2-2: Number of ACK/NACKs transmitted by the UE during Tecsi

Nack/nack, ecgi, fdd	Configuration of the serving cell in which the transmitted A0 are counted	
	Duplex mode configuration	SCS
66	FDD	15 kHz
145	FDD	30 kHz
298	FDD	60 kHz
28	TDD Note 1	15 kHz
67	TDD Note 1	30 kHz
144	TDD Note 1	60 kHz
175	TDD Note 2	60 kHz
363	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Configuration of the serving cell in which the transmitted ACK/NACKs NACK/NACK, MIB+ECGI, FDD are counted **Duplex mode configuration** SCS 84 FDD 15 kHz FDD 193 30 kHz 402 FDD 60 kHz 28 TDD Note 1 15 kHz TDD Note 1 81 30 kHz TDD Note 1 159 60 kHz TDD Note 2 233 60 kHz TDD Note 2 491 120 kHz NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18].

Table 9.4.4.1.2.2-3: Number of ACK/NACKs transmitted by the UE during TMIB+TECGI

TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

9.4.4.2 NR - E-UTRAN TDD RSTD measurements

9.4.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSTD measurements requested via LPP [22, 27].

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\;InterRAT,E-UTRAN\;TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{\text{RSTD InterRAT,E-UTRAN\,TDD}}$ starts. When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{RSTD InterRAT, E-UTRAN TDD}$ starts.

9.4.4.2.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT -UTRAN TDD RSTD, specified in TS 38.215 [4], for at least n=16cells, including the reference cell, within $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ ms as given below:

$$T_{\text{RSTD InterRAT, E-UTRAN TDD}} = T_{\text{PRS}} \cdot (M - 1) + \Delta$$
 ms

where

 $T_{RSTD InterRAT, E-UTRAN TDD}$ is the total time for detecting and measuring at least n cells,

 T_{PRS} is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.2.2-1, where a PRS positioning occasion is as defined in clause 9.4.4.1.2,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency *i* as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN TDD carrier frequencies.

Table 9.4.4.2.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,E-UTRAN\ TDD}$

Positioning subframe	Number of PRS positioning occasions ${\it M}$		
configuration period $T_{ m PRS}$	f2 Note1 f1 and f2 Note2		
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT	
>160 ms	8 x CSSFinterRAT	16 x CSSFinterRAT	
NOTE 1: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN TDD carrier frequency f2.			
NOTE 2: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN TDD carrier frequency f1 and the E-UTRAN TDD carrier frequency f2 respectively.			

The requirements in this clause shall apply for all TDD special subframe configurations specified in TS 36.211 [23] and for the TDD uplink-downlink configurations as specified in Table 9.4.4.2.2-2 for UE requiring measurement gaps for these measurements. For UEs capable of performing inter-RAT RSTD measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 9.4.4.2.2-3 shall apply.

Table 9.4.4.2.2-2: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations					
6, 15	3, 4 and 5					
25	1, 2, 3, 4, 5 and 6					
50, 75, 100	0, 1, 2, 3, 4, 5 and 6					
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].						

Table 9.4.4.2.2-3: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements without gaps

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations					
6, 15	1, 2, 3, 4 and 5					
25, 50, 75, 100	0, 1, 2, 3, 4, 5 and 6					
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].						

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{\text{RSTD InterRAT,E-UTRAN TDD}}$ provided:

$$\left(\operatorname{PRS} \hat{\mathbf{E}}_{s} / \operatorname{Iot} \right)_{ref} \ge -6 \text{ dB for all Frequency Bands for the reference cell,}$$
 $\left(\operatorname{PRS} \hat{\mathbf{E}}_{s} / \operatorname{Iot} \right)_{i} \ge -13 \text{ dB for all Frequency Bands for neighbour cell } i,$

$$\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref}$$
 and $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i}$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning

occasions,

PRP 1,2 $_{|dBm}$ according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

PRS \hat{E}_s / Iot is as defined in clause 9.4.4.1.2.

The time $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells i shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.2.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.2.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN \, TDD} + T_{MIB} + T_{ECGI} ,$$

where

 $T_{Detect, E-UTRAN \ TDD} = T_{Identify, E-UTRAN \ TDD} - T_{measure, E-UTRAN \ TDD}$ is according to clause 9.4.3 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \ TDD}=0$) when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver (T_{MIB} =0 when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.3.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are

created, specified in Table 9.4.4.2.2.2-1. When $T_{ECGI}>0$ and UE is using autonomous gaps during T_{ECGI} , the UE shall transmit at least $N_{ACK/NACK, ECGI, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created, specified in Table 9.4.4.2.2.2-2. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, TDD}$ ACK/NACKs specified in Table 9.4.4.2.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.2.2.2-1, 9.4.4.2.2.2-2 and 9.4.4.2.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.2.2.2-1: Minimum number of ACK/NACKs transmitted by the UE during T_{MB}

Nack/nack, mib, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted				
	Duplex mode configuration	SCS			
15	FDD	15 kHz			
39	FDD	30 kHz			
85	FDD	60 kHz			
0	TDD Note 1	15 kHz			
4	TDD Note 1	30 kHz			
12	TDD Note 1	60 kHz			
46	TDD Note 2	60 kHz			
104	TDD Note 2	120 kHz			
NOTE 1: TDD UL-DL config	uration is as specified in Table A.3.3.1-1 of	TS 38.101-1 [18].			
NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].					

Table 9.4.4.2.2.2-2: Minimum number of ACK/NACKs transmitted by the UE during T_{ECGI}

Nack/nack, ecgi, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted		
	Duplex mode configuration	SCS	
66	FDD	15 kHz	
145	FDD	30 kHz	
298	FDD	60 kHz	
28	TDD Note 1	15 kHz	
67	TDD Note 1	30 kHz	
144	TDD Note 1	60 kHz	
175	TDD Note 2	60 kHz	
363	TDD Note 2	120 kHz	

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.2.2.3: Minimum number of ACK/NACKs transmitted by the UE during TMIB+TECGI

Configuration of the serving cell in which the transmitted ACK/NACKs are counted		
Duplex mode configuration	SCS	
FDD	15 kHz	
FDD	30 kHz	
FDD	60 kHz	
TDD Note 1	15 kHz	
TDD Note 1	30 kHz	
TDD Note 1	60 kHz	
	60 kHz	
TDD Note 2	120 kHz	
ration is as specified in Table A.3.3.1-1 o		
	TDD Note 2 TDD Note 2 TDD Note 2 TDD Note 2	

9.4.5 Inter-RAT E-CID measurements

9.4.5.1 NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements

9.4.5.1.1 Introduction

The requirements in clause 9.4.5.1. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN FDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.1.2 Requirements

The requirements in clause 9.4.2 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.1.3.

9.4.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.4.5.2 NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements

9.4.5.2.1 Introduction

The requirements in clause 9.4.5.2. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN TDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.2.2 Requirements

The requirements in clause 9.4.3 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.2.3.

9.4.5.2.3 Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.5 L1-RSRP measurements for Reporting

9.5.1 Introduction

When configured by the network, the UE shall be able to perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed for a serving cell, including PCell, PSCell, or SCell, on the resources configured for L1-RSRP measurements within the active BWP.

The UE shall be able to measure all CSI-RS resources and/or SSB resources of the *nzp-CSI-RS-ResourceSet* and/or *csi-SSB-ResourceSet* within the CSI-Resource*Config* settings configured for L1-RSRP for the active BWP, provided that the number of resources does not exceed the UE capability indicated by *beamManagementSSB-CSI-RS*.

The UE shall report the measurement quantity (*reportQuantity*) and send periodic, semi-persistent or aperiodic reports, according to the *reportConfigType* according to the CSI reporting configuration(s) (*CSI-ReportConfig*) for the active BWP.

9.5.2 Requirements applicability

The requirements in clause 9.5 apply, provided:

- The CSI-RS or SSB or CSI-RS and SSB resources configured for L1-RSRP measurements are measurable.

An SSB resource configured for L1-RSRP shall be considered measurable when for each relevant SSB the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.1 and 10.1.20.1 for FR1 and FR2, respectively, for a corresponding band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.4.1 for a corresponding band.

A CSI-RS resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.2 and 10.1.20.2 for FR1 and FR2, repectively, for a corresponding band,
- CSI-RS_RP and CSI-RS Ês/Iot according to Annex B.2.4.2 for a corresponding band.

A CSI-RS and SSB resource configured for L1-RSRP shall be considered measurable when the measurable resource conditions are met for both CSI-RS resource and SSB resource.

Requirements are defined for periodic, semi-persistent and aperiodic resources.

9.5.3 Measurement Reporting Requirements

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to clause 10.1.19 for FR1 and 10.1.20 for FR2 if *nrofReportedRS* is configured to one. If *nrofReportedRS* is configured to

be larger than one, or if *groupBasedBeamReporting* is enabled, the UE shall use differential L1-RSRP based reporting as defined in clause 10.1.19 for FR1 and 10.1.20 for FR2. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in 10.1.6.

9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in a Semi-Persistent L1-RSRP measurement report shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUSCH, if a DCI request has been received.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUCCH, if an activation command [7] has been received.

The UE shall transmit the semi-persistent L1-RSRP reporting on PUSCH or PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.3 Aperiodic Reporting

Reported L1-RSRP measurements contained in aperiodic triggered, aperiodic triggered periodic and aperiodic triggered semi-persistent L1-RSRP reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send aperiodic L1-RSRP measurement reports, if a DCI trigger has been received.

After the UE receives CSI request in DCI, the UE shall transmit the aperiodic L1-RSRP reporting on PUSCH over the air interface at the time specified according to clause 6.1.2.1 in TS 38.214 [26].

9.5.4 L1-RSRP measurement requirements

9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_SSB}$.

The value of T_{L1-RSRP} Measurement Period SSB is defined in Table 9.5.4.1-1 for FR1 and Table 9.5.4.1-2 for FR2, where

- M=1 if higher layer parameter timeRestrictionForChannelMeasurement is configured, and M=3 otherwise
- N= 8.

For FR1,

- $P=\frac{1}{1-\frac{T_{SSB}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when SSB is not overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{\text{sharing factor}}$, when SSB is not overlapped with measurement gap and SSB is fully overlapped with SMTC period ($T_{\text{SSB}} = T_{\text{SMTCperiod}}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTCperiod}}}, \text{ when SSB is partially overlapped with measurement gap and SSB is partially overlapped}$

with SMTC occasion (T_{SSB} < T_{SMTCperiod}) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $\frac{1}{1-\frac{T_{SSB}}{MRGP}}$ * $P_{sharing\ factor}$, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{\min(T_{SMTCperiod}, MGRP)}}$, when SSB is partially overlapped with measurement gap ($T_{SSB} < MGRP$) and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $\frac{1}{1-\frac{T_{SSB}}{MRGP}}$ * $P_{sharing\ factor}$, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$) $P_{sharing\ factor} = 1$
 - if all of the reference signals configured for L1-RSRP reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or
 - if all of the reference signal configured for L1-RSRP reporting outside measurement gap and fullyoverlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by
 SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1
 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is
 configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

Where:

 $T_{SSB} = ssb$ -periodicityServingCell

T_{SMTCperiod} = the configured SMTC1 period or SMTC2 period if configured

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.1-1: Measurement period T_{L1-RSRP_Measurement_Period_SSB} for FR1

Config	guration	T _{L1-RSRP_Measurement_Period_SSB} (ms)			
non	-DRX	max(T _{Report} , ceil(M*P)*T _{SSB})			
DRX cycle	e ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{SSB}))			
DRX cycl	e > 320ms	ceil(M*P)*T _{DRX}			
Note:	$T_{SSB} = ssb-pe$	riodicityServingCell is the periodicity of the SSB-Index			
configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length					
	T _{Report} is configured periodicity for reporting.				

Table 9.5.4.1-2: Measurement period T_{L1-RSRP_Measurement_Period_SSB} for FR2

Configuration		T _{L1-RSRP_Measurement_Period_SSB} (ms)		
non-DRX		max(T _{Report} , ceil(M*P*N)*T _{SSB})		
DRX cycle ≤ 32	20ms	$max(T_{Report}, ceil(1.5*M*P*N)*max(T_{DRX},T_{SSB}))$		
DRX cycle > 32	20ms	ceil(1.5*M*P*N)*T _{DRX}		
Note: T _{SSB} = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting.				

9.5.4.2 CSI-RS based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured CSI-RS resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_CSI-RS}$.

The value of T_{L1-RSRP_Measurement_Period_CSI-RS} is defined in Table 9.5.4.2-1 for FR1 and in Table 9.5.4.2-2 for FR2, where

- For periodic and semi-persistent CSI-RS resources, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise
- For aperiodic CSI-RS resources M=1
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply if *qcl-InfoPeriodicCSI-RS* is configured for all the resources in the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requriements apply provided *qcl-info* is configured for all resources in the resource set and for each resource one RS has OCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.19.2 and 10.1.20.2 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requirements apply provided *qcl-info* is configured for all resources in the resource set.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2.

- P=1, when CSI-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{M_{RGP}}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- P=3, when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion (T_{CSI-RS} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < $T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}, \text{ when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5*T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{\min(T_{SMTCperiod}, MGRP)}}$, when CSI-RS is partially overlapped with measurement gap ($T_{CSI-RS} < MGRP$) and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)

Where:

T_{SMTCperiod} = the configured SMTC1 period or SMTC2 period if configured.

T_{CSI-RS} = the periodicity of CSI-RS configured for L1-RSRP measurement

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

Note: The overlap between CSI-RS for L1-RSRP measurement and SMTC means that CSI-RS for L1-RSRP measurement is within the SMTC window duration.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.2-1: Measurement period TL1-RSRP_Measurement_Period_CSI-RS for FR1

Conf	Configuration T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)		
no	n-DRX	max(T _{Report} , ceil(M*P)*T _{CSI-RS})	
DRX cyc	cle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{CSI-RS}))	
DRX cy	cle > 320ms	ceil(M*P)*T _{DRX}	
Note 1:	T _{CSI-RS} is the periodicity of CSI-RS configured for L1-RSRP		
Note 2:	measurement. T_{DRX} is the DRX cycle length. T_{Report} is configured periodicity for reporting.		
configured for L1-RSRP measurement is transmitted with Density = 3.			

Table 9.5.4.2-2: Measurement period T_{L1-RSRP_Measurement_Period_CSI-RS} for FR2

Conf	iguration	TL1-RSRP_Measurement_Period_CSI-RS (ms)		
nc	n-DRX	max(T _{Report} , ceil(M*P*N)*T _{CSI-RS})		
DRX cyc	cle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{CSI-RS}))		
DRX cy	cle > 320ms	ceil(M*P*N)*T _{DRX}		
Note 1:	1: T _{CSI-RS} is the periodicity of CSI-RS configured for L1-RSRP			
Note 2:	measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting.			

9.5.5 Measurement restriction for CSI-RS and SSB for L1-RSRP measurement

The UE is required to be capable of measuring SSB and CSI-RS for L1-RSRP without measurement gaps. The UE is required to perform the SSB and CSI-RS measurements with measurement restrictions as described in the following clauses.

9.5.5.1 Measurement restriction for SSB based L1-RSRP

For FR1, when the SSB for L1-RSRP measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement.

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
 - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

9.5.5.2 Measurement restriction for CSI-RS based L1-RSRP

For both FR1 and FR2, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for L1-RSRP measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and the other CSI-RS. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.
 - The CSI-RS for L1-RSRP measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

9.5.6 Scheduling availability of UE during L1-RSRP measurement

Scheduling availability restrictions when the UE is performing L1-RSRP measurement are described in the following clauses.

9.5.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH in FR1.

9.5.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking /CSI-RS for CQI on SSB symbols to be measured for L1-RSRP measurement.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

9.5.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- For the case where RS for L1-RSRP measurement is CSI-RS which is QCLed with active TCI state for PDCCH/PDSCH and not in a CSI-RS resource set with repetition ON, and N=1 applies as specified in clause 9.4.5.2
 - There are no scheduling restrictions due to L1-RSRP measurement performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on RS for L1-RSRP measurement symbols to be measured for L1-RSRP measurement.

When intra-band carrier aggregation is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the band on the symbols that fully or partially overlap with restricted symbols.

If following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than [2] slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

9.6 NE-DC: Measurements

9.6.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA FDD or TDD PSCell. The requirements apply to UEs that have been configured with NE-DC.

9.6.2 SFTD Measurements

9.6.2.1 Introduction

This clause contains requirements on UE capabilities for reporting of SFN and frame time difference between NR PCell and E-UTRA PSCell in RRC_CONNECTED state. The requirements comprise measurement reporting delay and measurement accuracy. The overall measurement reporting delay includes a RRC procedure delay specified in TS 38.331 [2], and the SFTD measurement reporting delay specified below.

9.6.2.2 SFTD Measurement requirements

When no DRX is used in either of the NR PCell and E-UTRA PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(0.2,[5] * SMTC period)$ s.

When DRX is used in either of the NR PCell or the E-UTRA PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in Table 9.6.2.2-1.

Table 9.6.2.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) ^{Note2}	T _{measure_} SFTD1 (S)
DRX cycle≤0.04	max(0.2,5 x SMTC period) (Note1)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note1: Number of DRX cycles dependent of DRX cycles de	ends upon the DRX cycle in use le refers to the DRX cycle length ell. When DRX is used in both PCell and this table refers to the longer of the DRX

If PSCell is changed without changing carrier frequency of PSCell while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure\ SFTD2} = (M+1)*(T_{measure\ SFTD1}) + M*T_{PSCell\ change\ NEDC}$$

where:

M is the number of times the E-UTRA PSCell is changed over the measurement period (Tmeasure_SFTD2), and

T_{PSCell_change_NEDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed to a different carrier frequency, the UE shall terminate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in clause 10.1.21.1.

10 Measurement Performance requirements

10.1 NR measurements

10.1.1 Introduction

The requirements in clause 10.1 apply as follows:

- intra-frequency requirements apply for PCell measurements in SA, NR-DC, or NE-DC operaion mode,
- intra-frequency requirements apply for PSCell measurements in NR-DC or EN-DC operaion mode,

- intra-frequency requirements apply for SCell measurements in SA operation mode with NR CA or any MR-DC operation mode with NR CA,
- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

10.1.2 Intra-frequency RSRP accuracy requirements for FR1

10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

Accı	ıracy	Conditions					
Normal	Extreme	SSB		lo ^{Note 1} range			
condition	condition	Ês/lot	NR operating band groups Note 2 Minimum Io		n lo	Maximum Io	
		dB		dBm/S	CS _{SSB}		
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70
		≥-6 dB	NR_FDD_FR1_B	-120.5	-117.5	N/A	-70
			NR_TDD_FR1_C	-120	-117	N/A	-70
±4.5	±4.5 ±9		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70
			NR_FDD_FR1_G	-118	-115	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR1.

The accuracy requirements in Table 10.1.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

Accı	ıracy	Conditions SSB Io Note 1 range					
Mormal	Evtromo	SSB					
Normal Extreme condition		Ês/lot Note 2	NR operating band groups Note 4	Minimum Io		lo	Maximum lo
		dB		dBm /	dBm / SCS _{SSB}		dBm/BW _{Channel}
dB dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}		
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	N/A	-50
±2	±2 ±3 ≥-3 dl	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
				NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50
±3	±3	≥-6 dB	Note 3	Note 3	Note 3	N/A	Note 3

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.2 Void

10.1.3 Intra-frequency RSRP accuracy requirements for FR2

10.1.3.1 Intra-frequency SS-RSRP accuracy requirements

10.1.3.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.3.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

Accuracy		Conditions					
Normal	Extreme	SSB	Io Note 2 range				
condition	condition	Ês/lot		Minimum	lo	Maximum Io	
	dB	dB	dBm / SCS _{SSB} Note 1				
dB			SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
±6	±9	≥-6	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		N/A	-70	
±8	±11		N/A		-70	-50	
Note 1. V	-l h d	Dafaana ana	I EIC ambariaal		defined in alcuses 7	2222426	

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of

TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.3.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR2.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2

Accuracy		Conditions					
Normal Extreme		SSB		nge			
condition	condition	Ês/lot	Minimum Io		Maximum lo		
			dBm / SCS _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = 120kHz		dBm/BW _{Channel}		
±6	±9	≥-6	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50		
Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.							
Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.							
Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.							
	e 4: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.						

10.1.3.2 Void

10.1.4 Inter-frequency RSRP accuracy requirements for FR1

10.1.4.1 Inter-frequency SS-RSRP accuracy requirements

10.1.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.4.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

Accuracy		Conditions							
Normal	Extreme	SSB	lo ^{Note 1} range						
condition condition		Ês/lot Note 2	NR operating band groups Note 3	Minimum Io			Maximum lo		
		dB		dBm / SCS _{SSB}					
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel		
±4.5	±9	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	N/A	-70		
			NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70		
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: Void

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.1.2 Relative Accuracy of SS-RSRP in FR1

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency in FR1compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.4.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB

Table 10.1.4.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

Accı	ıracy		Conditions						
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimur	n lo	Maximum Io		
		dB		dBm/S	CS _{SSB}				
dB	dB			SCS _{SSB} = SCS _{SSB} = 30 kHz		dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±4.5	±6	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.2 Void

10.1.5 Inter-frequency RSRP accuracy requirements for FR2

10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

-50

Accuracy **Conditions** lo Note 2 range SSB **Extreme** Normal Ês/lot condition condition Minimum Io Maximum lo dBm / SCS_{SSB} Note 1 SCS_{SSB} = SCS_{SSB} = dB dB dB dBm/BW_{Channel} dBm/BW_{Channel} 120kHz 240kHz Same value as SSB RP in Table B.2.3-2, according to UE Power N/A -70 ±6 ±9 ≥-4 class, operating band and angle of arrival

Table 10.1.5.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

N/A

-70

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.5.1.2 Relative SS-RSRP Accuracy

±11

±8

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell on a frequency in FR2 compared to the SS-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.5.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2

Accı	ıracy		Co	nditions		
Normal	Extreme	SSB	lo ^{Note 2} rang		е	
condition	condition	Ês/lot	Minim	Minimum Io		
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}	
			120kHz	240kHz		
			Same value a	s SSB_RP in		
±6	±9	≥-4		, according to	-50	
<u> 1</u> 0	19	=-4	UE Power class, operating		-30	
			band and an	gle of arrival		
			and EIS spheric	-		
			TS 38.101-2 [19	e]. Applicable si	de condition	
	selected depe					
	•		ce point, and as	sumed to have	constant EPRE	
	across the ba		A			
					may need to be	
	adjusted to ensure Ês/lot at UE baseband is above the value defined in					
_	this table. e 4: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to					
				SSB Es/lot of t	the pair of cells to	
\	which the req	uirement app	lies.			

10.1.5.2 Void

10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting is defined from 0 dBm to -30 dB with 2 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.6.1-1: SS-RSRP and CSI-RSRP measurement report mapping

Reported value	Measured quantity value (L3 SS-RSRP)	Measured quantity value (L1 SS-RSRP and CSI-RSRP)	Unit
RSRP_0	SS-RSRP<-156	Not valid	dBm
RSRP_1	-156≤ SS-RSRP<-155	Not valid	dBm
RSRP_2	-155≤ SS-RSRP<-154	Not valid	dBm
RSRP_3	-154≤ SS-RSRP<-153	Not valid	dBm
RSRP_4	-153≤ SS-RSRP<-152	Not valid	dBm
RSRP_5	-152≤ SS-RSRP<-151	Not valid	dBm
RSRP_6	-151≤ SS-RSRP<-150	Not valid	dBm
RSRP_7	-150≤ SS-RSRP<-149	Not valid	dBm
RSRP_8	-149≤ SS-RSRP<-148	Not valid	dBm
RSRP_9	-148≤ SS-RSRP<-147	Not valid	dBm
RSRP_10	-147≤ SS-RSRP<-146	Not valid	dBm
RSRP_11	-146≤ SS-RSRP<-145	Not valid	dBm
RSRP_12	-145≤ SS-RSRP<-144	Not valid	dBm
RSRP_13	-144≤ SS-RSRP<-143	Not valid	dBm
RSRP_14	-143≤ SS-RSRP<-142	Not valid	dBm
RSRP_15	-142≤ SS-RSRP<-141	Not valid	dBm
RSRP_16	-141≤ SS-RSRP<-140	RSRP<-140	dBm
RSRP_17	-140≤ SS-RSRP<-139	-140≤RSRP<-139	dBm
RSRP_18	-139≤ SS-RSRP<-138	-139≤ RSRP<-138	dBm
RSRP_111	-46≤ SS-RSRP<-45	-46≤ RSRP<-45	dBm
RSRP_112	-45≤ SS-RSRP<-44	-45≤ RSRP<-44	dBm
RSRP_113	-44≤ SS-RSRP<-43	-44≤ RSRP	dBm
RSRP_114	-43≤ SS-RSRP<-42	Not valid	dBm
RSRP_115	-42≤ SS-RSRP<-41	Not valid	dBm
RSRP_116	-41≤ SS-RSRP<-40	Not valid	dBm
RSRP_117	-40≤ SS-RSRP<-39	Not valid	dBm
RSRP_118	-39≤ SS-RSRP<-38	Not valid	dBm
RSRP_119	-38≤ SS-RSRP<-37	Not valid	dBm
RSRP_120	-37≤ SS-RSRP<-36	Not valid	dBm
RSRP_121	-36≤ SS-RSRP<-35	Not valid	dBm
RSRP_122	-35≤ SS-RSRP<-34	Not valid	dBm
RSRP_123	-34≤ SS-RSRP<-33	Not valid	dBm
RSRP_124	-33≤ SS-RSRP<-32	Not valid	dBm
RSRP_125	-32≤ SS-RSRP<-31	Not valid	dBm
RSRP_126	-31≤ SS-RSRP	Not valid	dBm
RSRP_127 (Note)	Infinity	Infinity	dBm

Iote: The value of RSRP_127 is applicable for RSRP threshold configured by the network as defined in TS 38.331 [2], but not for the purpose of measurement reporting.

Table 10.1.6.1-2: Differential SS-RSRP and CSI-RSRP measurement (for L1 reporting) report mapping

Reported value	Measured quantity value (difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0 ≥ △ RSRP>-2	dB
DIFFRSRP_1	-2≥ ∆ RSRP>-4	dB
DIFFRSRP_2	-4≥ ∆ RSRP>-6	dB
DIFFRSRP_3	-6≥ ∆ RSRP>-8	dB
DIFFRSRP_4	-8≥ ∆ RSRP>-10	dB
DIFFRSRP_5	-10 ≥ ∆ RSRP>-12	dB
DIFFRSRP_6	-12≥ ∆ RSRP>-14	dB
DIFFRSRP_7	-14≥ ∆ RSRP>-16	dB
DIFFRSRP_8	-16 ≥ △ RSRP>-18	dB
DIFFRSRP_9	-18 ≥ △ RSRP>-20	dB
DIFFRSRP_10	-20 ≥ △ RSRP>-22	dB
DIFFRSRP_11	-22≥ △ RSRP>-24	dB
DIFFRSRP_12	-24≥ ∆ RSRP>-26	dB
DIFFRSRP_13	-26≥ △ RSRP>-28	dB
DIFFRSRP_14	-28 ≥ △ RSRP>-30	dB
DIFFRSRP_15	-30 ≥ ∆ RSRP	dB

10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.7.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.7.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

Accı	ıracy		Conditions							
Normal	Extreme	SSB	lo ^{Note 1} range							
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum Io			
		dB		dBm /	SCS _{SSB}					
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50			
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±2.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2			

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

10.1.8 Intra-frequency RSRQ accuracy requirements for FR2

10.1.8.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

10.1.8.1.1 Absolute SS-RSRQ Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.8.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

Table 10.1.8.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

Accuracy			Conditions					
Normal Extreme		SSB		lo ^{Note 2} rang	je			
condition	condition	Ës/lot		num lo	Maximum Io			
			dBm / SC	S _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz				dBm/BW _{Channel}	
±2.5	±4	≽-3	Same value as SS B.2.2-2, according	-50				
±3.5	±4	≥-6	class, operating ba arrival	and and angle of	-50			
			I EIS spherical cove side condition select		lauses 7.3.2 and 7.3.4 of gle of arrival.			
Note 2: Id	Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth							
	· • • • • • • • • • • • • • • • • • • •							

10.1.9 Inter-frequency RSRQ accuracy requirements for FR1

10.1.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

10.1.9.1.1 Aboslute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.9.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.9.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

Accı	ıracy	Conditions							
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BWchannel	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
		NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.9.1.2 Relative Accuracy of SS-RSRQ in FR1

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR1 compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.9.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27 dB$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.9.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

Accı	ıracy		Conditions							
Normal	Extreme	SSB	SSB Io Note 1 range							
condition	condition	Ês/lot Note 2	NR operating band groups Note 4	Minimum		lo	Maximum Io			
		dB		dBm /	SCS _{SSB}					
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50			
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±3	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3			

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

10.1.10 Inter-frequency RSRQ accuracy requirements for FR2

10.1.10.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

10.1.10.1.1 Aboslute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.10.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

Table 10.1.10.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

Acc	uracy			Conditions		
Normal Extreme		SSB		9		
condition	condition	Ês/lot	Minim	num lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}	
±2.5	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50	
±3.5	±4	≥-4	class, operating baarrival	and and angle of	-50	
			EIS spherical cove		auses 7.3.2 and 7.3.4 of gle of arrival.	
Note 3: In	the test cases	s, the SSB Ês/		meters may need to	be adjusted to ensure	

10.1.10.1.2 Relative Accuracy of SS-RSRQ in FR2

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR2 compared to the RSRP measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.10.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.10.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2

Ac	curacy			Conditions		
Normal Extreme		SSB		lo ^{Note 2} rang	e	
condition	condition	Ês/lot	Minim	ium lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±3	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50	
±4	±4	≥-4	class, operating ba arrival	and and angle of	-30	
				rage as defined in cl ed depending on an	auses 7.3.2 and 7.3.4 of gle of arrival.	
Note 2:	lo specified at th	ne Reference p	point, and assumed	to have constant EP	RE across the bandwidth.	
				s/lot of the pair of ce		
	requirement app	olies.		•		
			lot and related para e the value defined		be adjusted to ensure	

10.1.11 RSRQ report mapping

10.1.11.1 SS-RSRQ measurement report mapping

The reporting range of SS-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-1: SS-RSRQ measurement report mapping

Reported value	Measured quantity value	Unit
SS-RSRQ_0	SS-RSRQ<-43	dB
SS-RSRQ_1	-43≤ SS-RSRQ<-42.5	dB
SS-RSRQ_2	-42.5≤ SS-RSRQ<-42	dB
SS-RSRQ_3	-42≤ SS-RSRQ<-41.5	dB
SS-RSRQ_4	-41.5≤ SS-RSRQ<-41	dB
SS-RSRQ_122	17.5≤ SS-RSRQ<18	dB
SS-RSRQ_123	18≤ SS-RSRQ<18.5	dB
SS-RSRQ_124	18.5≤ SS-RSRQ<19	dB
SS-RSRQ_125	19≤ SS-RSRQ<19.5	dB
SS-RSRQ_126	19.5≤ SS-RSRQ<20	dB
SS-RSRQ_127	20 ≤ SS-RSRQ	dB

10.1.12 Intra-frequency SINR accuracy requirements for FR1

10.1.12.1 Intra-frequency SS-SINR accuracy requirements in FR1

10.1.12.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.12.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.

Table 10.1.12.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

Accı	ıracy	Conditions							
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		lo	Maximum Io			
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
		NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.13 Intra-frequency SINR accuracy requirements for FR2

10.1.13.1 Intra-frequency SS-SINR accuracy requirements in FR2

10.1.13.1.1 Absolute SS-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.13.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.13.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2

Acc	uracy			Conditions				
Normal	Extreme	SSB		lo ^{Note 2} rang	je			
condition	condition	Ês/lot		ium lo	Maximum Io			
			dBm / SC	S _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}			
±3	±4	≥-3	Same value as SS B.2.2-2, according	to UE Power	-50			
±3.5	±4	≥-6	class, operating ba arrival	and and angle of	-50			
					lauses 7.3.2 and 7.3.4 of			
	•		side condition select		•			
					PRE across the bandwidth.			
			\$ Ês/lot and related parameters may need to be adjusted to ensure					
			e the value defined	in this table.				
Note 4:	Γhe requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.					

10.1.14 Inter-frequency SINR accuracy requirements for FR1

10.1.14.1 Inter-frequency SS-SINR accuracy requirements in FR1

10.1.14.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.14.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

Table 10.1.14.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

Accı	ıracy			Condit									
Normal	Extreme	SSB		lo ^{Note 1} range									
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum	lo	Maximum lo						
		dB		dBm /	SCS _{SSB}								
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}						
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50						
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50						
			NR_TDD_FR1_C	-120	-117	N/A	-50						
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50						
									NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50						
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50						
±3.5	<u>±</u> 4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2						

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.14.1.2 Relative Accuracy of SS-SINR in FR1

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR1 compared to the SS-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.14.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \leq 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.14.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

Accı	ıracy			Condit	-				
Normal	Extreme	SSB		lo ^{Note 1} range					
condition	condition	Ês/lot Note 2,4	NR operating band groups Note 5		Minimum	lo	Maximum Io		
		dB		dBm/S	SCS _{SSB}				
dB	dB			SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3		

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: The requirements apply for SSB Ês/lot ≤ [25] dB.
- NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.15 Inter-frequency SINR accuracy requirements for FR2

10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2

Acc	uracy			Conditions			
Normal	Extreme	SSB		lo ^{Note 2} rang	je		
condition	condition	Ês/lot		num lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±3	±4	≥-3	≥-3 Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±3.5	±4	≥-4	class, operating ba arrival	and and angle of	-50		
					lauses 7.3.2 and 7.3.4 of		
			side condition select				
Note 2:	o specified at th	ne Reference p	point, and assumed	to have constant EF	PRE across the bandwidth.		
			SB Ês/lot and related parameters may need to be adjusted to ensure				
			s above the value defined in this table.				
Note 4:	Γhe requiremen	ts apply for SS	SB \hat{E} s/lot \leq 25 dB.				

10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR2 compared to the SS-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.2-1: SS-SINR Inter frequency relative accuracy in FR2

Acc	uracy			Conditions		
Normal	Extreme	SSB		lo ^{Note 2} rang	е	
condition	condition	Ês/lot	Minim	ium lo	Maximum Io	
	dBm / SCS _{SSB} Note 1		Sss Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±3.5	±4	-50				
±4	±4	≥-6	class, operating ba arrival	and and angle of	-50	
			EIS spherical cover side condition selecte		auses 7.3.2 and 7.3.4 of gle of arrival.	
					RE across the bandwidth.	
	The parameter Sequirement app		he minimum SSB Ê	s/lot of the pair of ce	lls to which the	
Note 4: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						
Note 5: T	The requiremen	ts apply for SS	SB \hat{E} s/lot \leq 25 dB.			

10.1.16 SINR report mapping

10.1.16.1 SS-SINR measurement report mapping

The reporting range of SS-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR measurement report mapping

Reported value	Measured quantity value	Unit
SS-SINR_0	SS-SINR<-23	dB
SS-SINR_1	-23≤ SS-SINR<-22.5	dB
SS-SINR_2	-22.5≤ SS-SINR<-22	dB
SS-SINR_3	-22≤ SS-SINR<-21.5	dB
SS-SINR_4	-21.5≤ SS-SINR<-21	dB
SS-SINR_123	38≤ SS-SINR<38.5	dB
SS-SINR_124	38.5≤ SS-SINR<39	dB
SS-SINR_125	39≤ SS-SINR<39.5	dB
SS-SINR_126	39.5≤ SS-SINR<40	dB
SS-SINR_127	40≤ SS-SINR	dB

10.1.17 Power Headroom

10.1.17.1 Power Headroom Report

10.1.17.1.1 Power Headroom Report Mapping

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Table 10.1.17.1-1: Power headroom report mapping

Reported value	Measured quantity value (dB)
POWER_HEADROOM_0	PH < -32
POWER_HEADROOM_1	-32 ≤ PH < -31
POWER_HEADROOM_2	-31 ≤ PH < -30
POWER_HEADROOM_3	-30 ≤ PH < -29
POWER_HEADROOM_53	20 ≤ PH < 21
POWER_HEADROOM_54	21 ≤ PH < 22
POWER_HEADROOM_55	22 ≤ PH < 24
POWER_HEADROOM_56	24 ≤ PH < 26
POWER_HEADROOM_57	26 ≤ PH < 28
POWER_HEADROOM_58	28 ≤ PH < 30
POWER_HEADROOM_59	30 ≤ PH < 32
POWER_HEADROOM_60	32 ≤ PH < 34
POWER_HEADROOM_61	34 ≤ PH < 36
POWER_HEADROOM_62	36 ≤ PH < 38
POWER_HEADROOM_63	PH ≥ 38

10.1.18 PCMAX.c.f

The UE is required to report the UE configured maximum output power $(P_{CMAX,c,f})$ together with the power headroom. This clause defines the requirements for the $P_{CMAX,c,f}$ reporting.

10.1.18.1 Report Mapping

The $P_{CMAX,c,f}$ reporting range is defined from -29 dBm to 33 dBm with 1 dB resolution. Table 10.1.18.1-1 defines the reporting mapping.

Table 10.1.18.1-1 Mapping of P_{CMAX,c.f}

Reported value	Measured quantity value	Unit
PCMAX_C_00	P _{CMAX,c,f} < -29	dBm
PCMAX_C_01	$-29 \le P_{CMAX,c,f} < -28$	dBm
PCMAX_C_02	$-28 \le P_{CMAX,c,f} < -27$	dBm
PCMAX_C_61	$31 \le P_{CMAX,c,f} < 32$	dBm
PCMAX_C_62	$32 \le P_{CMAX,c,f} < 33$	dBm
PCMAX_C_63	33 ≤ P _{CMAX,c,f}	dBm

10.1.19 L1-RSRP accuracy requirements for FR1

10.1.19.1 SSB based L1-RSRP accuracy requirements

10.1.19.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

Acc	uracy	Conditions							
Normal	Extreme	SSB		lo	^{Note 1} range				
condition	condition	Ês/lot	NR operating band groups Note 2		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	N/A	-70		
±5.0	±9.5	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70		
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50		

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.19.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.2-1: SSB based L1-RSRP relative accuracy in FR1

Accı	ıracy		Conditions							
Normal	Extreme	SSB		lo ^N						
condition	condition	Ês/lot Note 2			Minimum Io					
				dBm /	SCS _{SSB}					
dB	dB	dB		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
		i		NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of SSBs to which the requirement applies.

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2..

10.1.19.2 CSI-RS based L1-RSRP accuracy requirements

10.1.19.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.1-1.

Table 10.1.19.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR1

Accı	ıracy				Condition				
Normal	Extreme	CSI-			lo ^{Note 1} range				
condition	condition	RS Ês/lot	NR operating band groups Note 2		Mi	nimum lo		Maximum Io	
				dB	m / SCS _{CS}	SI-RS			
dB	dB	dB		SCS _{CSI-} RS = 15 kHz	SCS _{CSI-} RS = 30 kHz	SCS _{CSI-} RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-70	
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-70	
			NR_TDD_FR1_C	-120	-117	-114	N/A	-70	
±5.0	±9.5	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-70	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-70	
			NR_FDD_FR1_G	-118	-115	-112	N/A	-70	
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-70	
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	N/A	-70	-50	

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

Table 10.1.19.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR1

Accı	ıracy				Condition				
		CSI-	lo ^{Note 1} range						
Normal condition	Extreme condition	RS Ês/lot Note 2 NR operating band groups Note 4			Minimum Io				
		dB		dB	m / SCScs	SI-RS			
dB	dB dB			SCScsi- RS = 15 kHz	SCScsi- RS = 30 kHz	SCScsi- RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	-114	N/A	-50	
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-50	
			NR_FDD_FR1_G	-118	-115	-112	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-50	

NOTE 2: The parameter CSI-RS Ês/lot is the minimum CSI-RS Ês/lot of the pair of CSI-RS resources to which the requirement applies.

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.20 L1-RSRP accuracy requirements for FR2

10.1.20.1 SSB based L1-RSRP accuracy requirements

10.1.20.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.1-1: SSB based L1-RSRP absolute accuracy in FR2

ſ	Accuracy			Conditions			
ĺ	Normal	Extreme	e SSB Io Note 1 range		lo Note 1 range		
	condition	condition	Ês/lot	Minimum Io			Maximum lo
ĺ				dBm / SCS _{SSB} Note 2			
	dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}

±6.5	±9.5	≥-3	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	N/A	-70
±8.5	±11.5	≥-3	N/A	-70	-50

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.20.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.2-1: SSB based L1-RSRP relative accuracy in FR2

Accuracy			Co	nditions		
Normal	Extreme	SSB		lo Note 1 rang	е	
condition	condition	Ês/lot	Minim	um lo	Maximum Io	
			dBm / SC	Sss Note 3		
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}	
			120kHz	240kHz		
			Same value a			
			Table B.2.4.1	-2, according		
±6.5	±9.5	≥-3	to UE Pov	,	-50	
			operating ba	nd and angle		
			of ar	rival		
	•		ce point, and as	sumed to have	constant EPRE	
	across the ba			•		
				SSB Es/lot of	the pair of SSBs	
	to which the r					
	NOTE 3: Values based on Refsens and EIS spherical coverage as defined in					
	clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition					
	selected depe					
NOTE 4:	n the test cas	ses, the SSB	Es/lot and relate	ed parameters	may need to be	

adjusted to ensure Ês/lot at UE baseband is above the value defined in

10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

this table.

10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.1-1.

Table 10.1.20.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR2

Accuracy			Conditions				
Normal	Extreme	CSI-RS		lo Note 1 range			
condition	condition	Ês/lot		Minimum	lo	Maximum lo	
			dBm / SCS	dBm / SCS _{CSI-RS} Note 2			
dB	dB	dB	SCS _{CSI-RS} = 60kHz	SCS _{CSI-RS} = 120kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
±6.5	±9.5	≥-3	Same value as CSI- RS_RP in Table B.2.4.2- 2, according to UE Power class, operating band and angle of arrival		N/A	-70	
+8.5	+11.5	≥-3		/A	-70	-50	

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.20.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.2-1.

Table 10.1.20.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR2

Accuracy		Conditions			
Normal Extreme		CSI-RS	lo ^{Note 1} range		
condition	condition	Ês/lot	Minimum Io		Maximum lo
			dBm / S	CS _{CSI-RS}	Maximum Io
dB	dB	dB	SCS _{CSI-RS} = 60kHz	SCS _{CSI-RS} = 120kHz	dBm/BW _{Channel}

±6.5	±9.5	≥-3	Same value as CSI-RS RP in Table B.2.4.2-2, according to UE Power class, operating band and angle of arrival	-50		
NOTE 1:	1: Io specified at the Reference point, and assumed to have constant EPRE					
	across the ba	ndwidth.				
NOTE 2:	The paramete	er CSI-RS Ês	/Iot is the minimum CSI-RS Ês/	lot of the pair of		
	CSI-RS resou	irces to which	n the requirement applies.			
NOTE 3:	Values based	on Refsens	and EIS spherical coverage as	defined in		
	clauses 7.3.2	and 7.3.4 of	TS 38.101-2 [19]. Applicable si	de condition		
	selected depending on angle of arrival.					
NOTE 4:	In the test cases, the CSI-RS Ês/lot and related parameters may need to					
	be adjusted to ensure Ês/lot at UE baseband is above the value defined in					
	this table.					

10.1.21 SFTD accuracy requirements

10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell lo range conditions in FR1

	lo ^N	ote 1 range			
	NR operating band groups Note 4, 5	Minimun	Minimum Io Note 2, 3		
Parameter		dBm/	SCS _{SSB}		
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50	
	NR_FDD_FR1_B	-120.5	-117.5	-50	
	NR_TDD_FR1_C	-120	-117	-50	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50	
	NR_FDD_FR1_G	-118	-115	-50	
	NR_FDD_FR1_H	-117.5	-114.5	-50	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The condition level is increased by ΔR_{IB,c} as defined in clause 7.3B in TS 38.101-3 [54], depending on E-UTRA NR band combination.
- NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA NR band combination.
- NOTE 4: NR operating band groups are as defined in clause 3.5.
- NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable.

For FR2 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-2.

Table 10.1.21.1-2: PCell lo range conditions in FR2

		Io Note 1 range				
Donomoton	r Minimum Io Note 2, 3 dBm/ SCSssB		Maximum lo			
Parameter			dD.m./DW			
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}			
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50			
NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						

For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- RSRP_{dBm} according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.
- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell lo range conditions

Davamatav	Io Note 1 range					
Parameter	E-UTRA operating band groups Note 3	Minimum Io	Maximum lo			
		dBm/15kHz Note 2	dBm/BW _{Channel}			
	FDD_A, TDD_A	-121	-50			
	FDD_C, TDD_C	-120	-50			
	FDD_D	-119.5	-50			
Conditions	FDD_E, TDD_E	-119	-50			
	FDD_F	-118.5	-50			
	FDD_G	-118	-50			
	FDD_H	-117.5	-50			
	FDD_N	-114.5	-50			

NOTE 1: When in dBm/15kHz, the minimum lo condition is expressed as the average lo per RE over all REs in that symbol. Io may be different in different symbols within a subframe.

NOTE 2: The condition level is increased by Δ>0, when applicable, as described in clauses B.4.2 and B.4.3 in TS36.133 [15].

NOTE 3: E-UTRA operating band groups are as defined in clause 3.5 in TS 36.133 [15].

Table 10.1.21.1-4: SFTD measurement accuracy

	Co	onditions		
Accuracy	Ês/lot Note 2	Frequency range		
Ts Note 1	dB			
40*64*Tc	> 0 AD	FR1		
40*64*Tc	≥-3 dB	FR2		

NOTE 1: To is the basic timing unit defined in TS 38.211 [6].

NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies.

10.1.21.2 SFTD acuracy requirements for NR-DC

The SFN and frame timing difference (SFTD) is measured between PCell in FR1 and PSCell in FR2 under NR dual connectivity.

The accuracy requirements in Table 10.1.21.2-3 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-1.

Table 10.1.21.2-1: PCell lo range conditions in FR1

	lo ^{No}	te 1 range		
	NR operating band groups Note 2	Minim	Maximum Io	
Parameter		dBm/	SCS _{SSB}	
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50
	NR_FDD_FR1_B	-120.5	-117.5	-50
	NR_TDD_FR1_C	-120	-117	-50
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50
	NR_FDD_FR1_G	-118	-115	-50
	NR_FDD_FR1_H	-117.5	-114.5	-50

NOTE 1: Io is assumed to have constant EPRE across the bandwidth. NOTE 2: NR operating band groups are as defined in clause 3.5.2.

For FR2 PSCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.2-2: PSCell lo range conditions in FR2

	lo ^{Note 1} range					
Parameter	Minimum	Maximum Io				
Faranietei	dBm/ S	dBm/BWchannel				
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	CIDITI/DVVChannel			
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50			

NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB £s/lot and related parameters may need to be adjusted to ensure £s/lot at UE baseband is above the value defined in this table.

Table 10.1.21.2-3: SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	≥ -3 dB	Between FR1 and FR2			
NOTE 1: Tc is the basic timir	11 [6].				
NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which t					
requirement applies	S.				

10.1.21.3 Inter frequency SFTD acuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and inter-frequency neighbour cell.

The accuracy requirements in Table 10.1.21.3-3 are applicable under the following conditions:

For FR1 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-1.

Table 10.1.21.3-1: PCell, inter frequency neighbour cell lo range conditions in FR1

	lo	Note 1 range				
	NR operating band groups Note 2	Minim	Minimum Io			
Parameter		dBm/	dBm/ SCS _{SSB}			
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}		
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50		
	NR_FDD_FR1_B	-120.5	-117.5	-50		
	NR_TDD_FR1_C	-120	-117	-50		
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50		
	NR_FDD_FR1_G	-118	-115	-50		
	NR_FDD_FR1_H	-117.5	-114.5	-50		

For FR2 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.3-2: PCell, inter frequency neighbour cell lo range conditions in FR2

		lo ^{Note 1} range					
Parameter	Minimum	Maximum Io					
Parameter	dBm/ S	SCS _{SSB}	dBm/BWchannel				
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	CIDITI/DVVChannel				
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50				
NOTE 2: Va 2 NOTE 3: In	NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						

Table 10.1.21.3-3: Inter frequency SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	≥ -3 dB	FR1, FR2			
NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].					
NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the					
requirement applies	S.				

10.2 E-UTRAN measurements

10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC or NE-DC operation mode.

The requirements in clause 10.2 are applicable for a UE:

- in RRC_CONNECTED state
- performing measurements with appropriate measurement gaps according to clause 9.1.2.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The reporting range and mapping specified for RSRQ measurements in clause 9.1.7 of TS 36.133 [15] shall apply.

10.2.4 E-UTRAN RSTD measurements

The requirements in this clause are valid for UE supporting this capability.

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR — E-UTRAN FDD and inter-RAT NR — E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

The reporting range and mapping for E-UTRA RS-SINR measurements shall be the same as specified for RS-SINR measurements in clause 9.1.17.1 of TS 36.133 [15].

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Annex A (normative): Test Cases

A.1 Purpose of annex

A.2 Requirement classification for statistical testing

Requirements in this specification are either expressed as absolute requirements with a single value stating the requirement, or expressed as a success rate. There are no provisions for the statistical variations that will occur when the parameter is tested.

Annex A outlines the tests in more detail and lists the test parameters needed. The test will result in an outcome of a test variable value for the device under test (DUT) inside or outside the test limit. Overall, the probability of a "good" DUT being inside the test limit(s) and the probability of a "bad" DUT being outside the test limit(s) should be as high as possible. For this reason, when selecting the test variable and the test limit(s), the statistical nature of the test is accounted for.

The statistical nature depends on the type of requirement. Some have large statistical variations, while others are not statistical in nature at all. When testing a parameter with a statistical nature, a confidence level is set. This establishes the probability that a DUT passing the test actually meets the requirements and determines how many times a test has to be repeated and what the pass and fail criteria are. Those aspects are not covered by TS 38.133. The details of the tests on how many times to run it and how to establish confidence in the tests are described in TS 38.533 [5]. This Annex establishes the variable to be used in the test and whether it can be viewed as statistical in nature or not.

A.2.1 Types of requirements in TS 38.133

A.2.1.1 Time and delay requirements on UE higher layer actions

A very large part of the RRM requirements are delay requirements:

- In RRC_IDLE state mobility (clause A.4.x, A.5.x, A.6.x and A.7.x) there is cell re-selection delay.
- In RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6) there is handover delay, cell search delay and measurement reporting delay.
- In RRC Connection Control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2) there is RRC re-establishment delay.

All have in common that the UE is required to perform an action observable in higher layers (e.g. camp on the correct cell) within a certain time after a specific event (e.g. when a new strong pilot or reference signal appears). The delay time is statistical in nature for several reasons, among others that several of the measurements are performed by the UE in a fading radio environment.

The variations make a strict limit unsuitable for a test. Instead there is a condition set for a correct action by the UE, e.g. that the UE shall camp on the correct cell within X seconds. Then the rate of correct events is observed during

repeated tests and a limit is set on the rate of correct events, usually 90% correct events are required. How the limit is applied in the test depends on the confidence required, further detailed are in TS 38.533 [5].

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Measurements of power levels, relative powers and time

A very large number of requirements are on measurements that the UE performs:

- In RRC CONNECTED state mobility (clauses A.4.3, A.5.3, A.6.3 and A.7.3) there are measurement reports.
- In Measurement Performance Requirements (clauses A.4.7, A.5.7, A.6.7 and A.7.7) there are requirements for all type of measurements.

The accuracy requirements on measurements are expressed in this specification as a fixed limit (e.g. +/-X dB), but the measurement error will have a distribution that is not easily confined in fixed limits. Assuming a Gaussian distribution of the error, the limits will have to be set at $\pm -3.29\sigma$ if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

Implementation requirements A.2.1.3

A few requirements are strict actions the UE should take or capabilities the UE should have, without any allowance for deviations. These requirements are absolute and should be tested as such. Examples are:

- "Event triggered report rate" in RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6)
- "Correct behaviour at time-out" in RRC connection control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2)

Physical layer timing requirements A.2.1.4

There are requirements on Timing (clauses A.4.4, A.5.4, A.6.4 and A.7.4). There are both absolute and relative limits on timing accuracy depending upon the type of requirement. Examples are:

- Initial Transmit Timing (clauses A.4.4.1, A.5.4.1, A.6.4.1 and A.7.4.1) has an absolute limit on timing accuracy.
- Timing Advance (clauses A.4.4.2, A.5.4.2, A.6.4.2 and A.7.4.2) has a relative limit on timing accuracy.

A.3 RRM test configurations

A.3.1 Reference measurement channels

A.3.1.1 PDSCH

A.3.1.1.1 FDD

Table A.3.1.1.1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit		Value
Reference channel		SR.1.1 FDD	
Channel bandwidth	MHz	10	
Number of transmitter antennas		1	
Allocated resource blocks for PDSCH Note 1		24	
Allocated slots per Radio Frame		10	
Radio frame containing SSB	slots	Note 5	
Radio frame not containing SSB	slots	10	
MCS index		4	
Modulation		QPSK	
Target Coding Rate		1/3	
Number of control symbols		2	
PDSCH mapping type		Type A	
Information Bit Payload			
For slots with RMSI Note 2	bits	1864	
Number of Code Blocks per slot		1	
Binary Channel Bits Per slot			
For slots with RMSI Note 2, Note 4	bits	6048	

Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.

Note 2: PDSCH is scheduled on the slots with RMSI.

Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].

Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.

Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.

A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit		Value
Reference channel		SR.1.1 TDD	
Channel bandwidth	MHz	10	
Number of transmitter antennas		1	
Allocated resource blocks for PDSCH Note 1		24	
Allocated slots per Radio Frame			
Radio frame containing SSB	slots	Note 5	
Radio frame not containing SSB	slots	4	
MCS table		64QAM	
MCS index		4	
Modulation		QPSK	
Target Coding Rate		1/3	
Number of control symbols		2	
PDSCH mapping type		Type A	
Information Bit Payload			
For slots with RMSI Note 2	bits	1864	
Number of Code Blocks per slot		1	
Binary Channel Bits Per slot			
For slots with RMSI Note 2,	bits	6048	

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.

Table A.3.1.1.1-2: PDSCH Reference Measurement Channels for SCS=30kHz

Parameter	Unit		Value)	
Reference channel		SR.2.1 TDD			
Channel bandwidth	MHz	40			
Number of transmitter antennas		1			
Allocated resource blocks for PDSCH Note 1		24			
Allocated slots per Radio Frame					
Radio frame containing SSB	slots	Note 5			
Radio frame not containing SSB	slots	10			
MCS table		64QAM			
MCS index		4			
Modulation		QPSK			
Target Coding Rate		1/3			
Number of control symbols		2			
PDSCH mapping type		Type A			
Information Bit Payload					
For slots with RMSI Note 2	bits	1864			
Number of Code Blocks per slot		1			
Binary Channel Bits Per slot					
For slots with RMSI Note 2, Note 4	bits	6048			

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.

Table A.3.1.1.1-3: PDSCH Reference Measurement Channels for SCS=120kHz

Parameter	Unit			Value		
Reference channel		SR.3.1 TDD				
Channel bandwidth	MHz	100				
Number of transmitter antennas		1				
Allocated resource blocks for PDSCH Note 1		24				
Allocated slots per Radio Frame						
Radio frame containing SSB	slots	Note 5				
Radio frame not containing SSB	slots	48				
MCS table		64QAM				
MCS index		4				
Modulation		QPSK				
Target Coding Rate		1/3				
Number of control symbols		2				
PDSCH mapping type		Type A				
Information Bit Payload						
For slots with RMSI Note 2	bits	1864				
Number of Code Blocks per slot		1				
Binary Channel Bits Per slot						
For slots with RMSI Note 2, Note 4	bits	6048			 	

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.

A.3.1.2 CORESET for RMSI scheduling

A.3.1.2.1 FDD

Table A.3.1.2.1-1: RMSI CORESET Reference Channel for FDD with SCS=15KHz

Parameter	Unit		,	Value	
Reference channel		CR.1.1			
		FDD			
Channel bandwidth	MHz	10			
Subcarrier spacing for	kHz	15			
RMSI CORESET					
Allocated resource blocks		24			
for RMSI CORESET Note 7					
Subcarrier spacing for	kHz	15			
SSB CCD and DMCI		Dattama 4			
SSB and RMSI		Pattern 1			
CORESET multiplexing configuration Note 7					
Offset between SSB and	RB	0 (Note8)			
RMSI CORESET Note 3, 7	I NB	0 (140(60)			
Configuration of PDCCH		Index 4			
monitoring occasions for					
RMSI CORESET Note 4					
Number of transmitter		1			
antennas					
Duration of RMSI	symbols	2			
CORESET Note 7					
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder		6			
granularity		_			
REG bundle size		6			
Mapping from REG to		Distributed			
CCE					
Cell ID	1.1.	Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3]
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.2.2 TDD

Table A.3.1.2.2-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz

Parameter	Unit		Value
Reference channel		CR.1.1 TDD	
Channel bandwidth	MHz	10	
Subcarrier spacing	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

Parameter	Unit		Value
Reference channel		CR.2.1 TDD	
Channel bandwidth	MHz	40	
Subcarrier spacing	kHz	30	
Allocated resource blocks for RMSI CORESET Note 7		24	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

Parameter	Unit			Value		
Reference channel		CR.3.1 TDD				
Channel bandwidth	MHz	100				
Subcarrier spacing	kHz	120				
Allocated resource blocks for RMSI CORESET Note 7		24				
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1				
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)				
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4				
Number of transmitter antennas		1				
Duration of RMSI CORESET Note 7	symbols	2				
DCI Format Note 1		Note 2				
Aggregation level	CCE	8				
DMRS precoder granularity		6				
REG bundle size		6				
Mapping from REG to CCE		Distributed				
Cell ID		Note 5				
Payload (without CRC)	bits	Note 6				

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-12 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-8 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.3 CORESET for RMC scheduling

A.3.1.3.1 **FDD**

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

Parameter	Unit		Value
Reference channel		CCR.1.1 FDD	
Channel bandwidth	MHz	10	
Subcarrier spacing	kHz	15	
Allocated resource blocks for CORESET Note 3		24	
Number of transmitter antennas		1	
Duration of CORESET	symbols	2	
REG bundle size		6	
DMRS precoder granularity		Same as REG bundle size	
CCE to REG mapping		Interleaved	
Interleave n_shift		0	
Interleave size		2	
Beamforming Pre-Coder		N/A	
Aggregation level	CCE	8	
DCI formats		Note 1	
Payload size (without CRC)	bits	Note 2	

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

Parameter	Unit			Value		
Reference channel		CCR.1.1 TDD				
Channel bandwidth	MHz	10				
Subcarrier spacing	kHz	15				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbols	2				
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleaved				
Interleave n_shift		0				
Interleave size		2				
Beamforming Pre-Coder		N/A				
Aggregation level	CCE	8				
DCI formats		Note 1				
Payload size (without CRC)	bits	Note 2				

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

Parameter	Unit			Value		
Reference channel		CCR.2.1 TDD				
Channel bandwidth	MHz	40				
Subcarrier spacing	kHz	30				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbols	2				
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleaved				
Interleave n_shift		0				
Interleave size		2				
Beamforming Pre-Coder		N/A				
Aggregation level	CCE	8				
DCI formats		Note 1				
Payload size (without CRC)	bits	Note 2				

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration.
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

Table A.3.1.3.2-3: Control Channel RMC for TDD with SCS=120KHz

Parameter	Unit			Value		
Reference channel		CCR.3.1	CCR.3.2	CCR.3.3		
		TDD	TDD	TDD		
Channel bandwidth	MHz	100	100	100		
Subcarrier spacing	kHz	120	120	120		
Allocated resource blocks for CORESET Note 3		24	24	24		
Number of transmitter antennas		1	1	1		
monitoringSlotPeriodicityAndOffset		sl160	sl160	sl160		
		0	0	80		
monitoringSymbolsWithinSlot		1100000	0011000	1100000		
		0000000	0000000	0000000		
Duration of CORESET	slot	1	1	1		
REG bundle size		6	6	6		
		Same as	Same as	Same as		
DMRS precoder granularity		REG	REG	REG		
Divince proceder grandianty		bundle	bundle	bundle		
		size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0		
Interleave size		2	2	2		
Beamforming Pre-Coder		N/A	N/A	N/A		
Aggregation level	CCE	8	8	8		
DCI formats		Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration.
Allocated in the same resource blocks where the associated PDSCH RMC is scheduled. Note 3:

A.3.1.4 TDD UL/DL configuration

Table A.3.1.4-1: TDD UL/DL configuration for SCS=15kHz

Parameter	Unit		Value	
Reference channel		TDDConf.1.1		
referenceSubcarrierSpacing	kHz	15		
TDD UL/DL pattern 1 Note 2		'DSUU' S='10DL:2GP:2UL'		
dl-UL-	ms	3= 10DL.2GF.20L		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		10		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dl-UL-	ms	1		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		0		
nrofUplinkSlot		0		
nrofUplinkSymbols		0		

Note 2: For information

Table A.3.1.4-2: TDD UL/DL configuration for SCS=30kHz

Parameter	Unit	Value			
Reference channel		TDDConf.2.1			
referenceSubcarrierSpacing	kHz	30			
TDD UL/DL pattern 1 Note 2		'3D1S4U'			
		S='6DL:4GP:4UL'			
dl-UL-	ms	4			
TransmissionPeriodicity					
nrofDownlinkSlots		3			
nrofDownlinkSymbols		6			
nrofUplinkSlot		4			
nrofUplinkSymbols		4			
TDD UL/DL pattern 2 Note 2		'DD'			
dI-UL-	ms	1			
TransmissionPeriodicity					
nrofDownlinkSlots		2			
nrofDownlinkSymbols		0			
nrofUplinkSlot		0			
nrofUplinkSymbols		0			
Note 1: As specified in TS 38 213	3 [3] and TS 3	88 331 [2]	<u> </u>		

As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

Table A.3.1.4-3: TDD UL/DL configuration for SCS=120kHz

Parameter	Unit		Value	
Reference channel		TDDConf.3.1		
referenceSubcarrierSpacing	kHz	120		
TDD UL/DL pattern 1 Note 2		'DDDSU'		
		S='10DL:2GP:2UL'		
dl-UL-	ms	0.625		
TransmissionPeriodicity				
nrofDownlinkSlots		3		
nrofDownlinkSymbols		10		
nrofUplinkSlot		1		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		Not configured		
dl-UL-	ms	Not configured		
TransmissionPeriodicity				
nrofDownlinkSlots		Not configured		
nrofDownlinkSymbols		Not configured		
nrofUplinkSlot		Not configured		
nrofUplinkSymbols		Not configured		

Note 2: For information

OFDMA channel noise generator (OCNG) A.3.2

A.3.2.1 Generic OFDMA Channel Noise Generator (OCNG)

The OCNG pattern is used in a test for modelling allocations of unused resources in the channel bandwidth to virtual UEs (which are not under test). The OCNG pattern comprises PDCCH and PDSCH transmissions to the virtual UEs.

A.3.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

Table A.3.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs

OCNG Parameters	Control Region	Data Region				
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)				
Channel	PDCCH	PDSCH				
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data				
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Aggregation level	Same as used in PDCCH RMC	N/A				
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.						

REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell.

A.3.2.1.2 OCNG pattern 2: Generic OCNG pattern for all unused REs for 2AoA setup

Table A.3.2.1.2-2: OP.2: Generic OCNG pattern for all unused REs for 2AoA setup

OCNG Parameters	Control Region	Data Region					
Probe	Transmitting the serving beam						
Resource allocation	Unused REs (Note 1) in the symbols where SSB/CSI-RS are not transmitted from both the serving	Unused REs (Note 2) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving					
	beam probe and non-serving beam probe.	beam probe.					
Channel	PDCCH	PDSCH					
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data					
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC					
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC					
Aggregation level	Same as used in PDCCH RMC	N/A					
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC					
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC					
CP length	h Same as used in PDCCH RMC Same as used in P						
Note 1: REs not used in	the active CORESETs where PDCCH is	scheduled for the UE under test.					
Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell.							
Note 3: No OCNG is trai	DCNG is transmitted from the probe transmitting non-serving beam.						

A.3.2.1.3 OCNG pattern 3: Generic OCNG pattern for unused REs in the same bandwidth as PDSCH RMC

Table A.3.2.1.3-1: OP.3: Generic OCNG pattern for unused REs in the same BW as RMC

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the PDSCH RMC of the serving cell.

Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the PDSCH RMC of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the PDSCH RMC of the serving cell.

A.3.2.1.4 OCNG pattern 4: Generic OCNG pattern for all unused REs outside SSB slot(s)

Table A.3.2.1.4-1: OP.4: Generic OCNG pattern for all unused REs outside SSB slot(s)

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

A.3.2.2 Void

A.3.3 Reference DRX configurations

A.3.3.1 DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.1-1: DRX.1: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	40 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	

e: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignmen timer parameters are specified in clause 6.3.2 in TS 38.331 [2]

A.3.3.2 DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.2-1: DRX.2: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	640 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.3 DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity

Table A.3.3.3-1: DRX.3: DRX cycle = 40 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	40 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.4 DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity

Table A.3.3.4-1: DRX.4: DRX cycle = 160 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf2
drx-RetransmissionTimer	Psf16
longDRX-CycleStartOffset	sf160, 0
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	

ote: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].

A.3.3.5 DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.5-1: DRX.5: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf1920
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf320, 0
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.6 DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms

Table A.3.3.6-1: DRX.6: DRX cycle = 320 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	320 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.7 DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.7-1: DRX.7: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	640 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.8 DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.8-1: DRX.8: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	320 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.9 DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.9-1: DRX.9: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf100
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf40, 0
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].	

A.3.3.10 DRX Configuration 10: DRX cycle = 640 ms

Table A.3.3.10-1: DRX.10: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf1920
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf640, 0
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].	

A.3.3.11 DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity

Table A.3.3.11-1: DRX.11: DRX cycle = 20 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	20 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.4 Test Cases with Different Channel Bandwidths

A.3.4.1 Test Cases with Different E-UTRA Channel Bandwidths

A.3.4.1.1 Introduction

In Annex A test cases involving E-UTRA cell(s) may be defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement.

A.3.4.1.2 Principle of testing

If multiple test cases involving E-UTRA cell(s) are defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement that is E-UTRA channel bandwidth independent, then the UE needs to be tested with only one channel bandwidth in each E-UTRA cell and with the same bandwidth in all the E-UTRA cells used in the test case.

A.3.5 Test Cases for Synchronous and Asynchronous DC Operations

A.3.5.1 EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations

A.3.5.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for EN-DC operation in synchronous and asynchronous scenarios.

In Annex A test cases may be defined in both synchronous EN-DC and asynchronous EN-DC scenarios to verify the same type of RRM requirement.

A.3.5.1.2 Principle of Testing

If EN-DC test cases are defined in both synchronous and asynchronous EN-DC scenarios to verify the same type of RRM requirement then the UE capable of both synchronous and asynchronous EN-DC operations needs to be tested with one of the tests in either synchronous or asynchronous EN-DC scenarios.

A.3.6 Antenna configurations

A.3.6.1 Antenna configurations for FR1

Unless otherwise specified, NR FDD or NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

A.3.6.1.1 Antenna connection for 4 Rx capable UEs

A.3.6.1.1.1 Introduction

All tests in clause A.4 and A.6 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.4 or A.6 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

A.3.6.1.1.2 Principle of testing

A.3.6.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one 2RX band, the, all single carrier tests specified in clause A.4 and A.6 except those in A.4.7 and A.6.7 shall be tested on any band where 2RX is supported with the antenna connection specified in A.6.3.1.2.4. For single carrier tests specified in clause A.4.7 or A.6.7, all tests shall be tested with the antenna connection specified in A.3.6.1.1.2.4 for bands where 2RX is supported, and the antenna connection specified in A.3.6.1.1.2.5 for bands where 4RX is supported.

For 4RX capable UEs which do not support any 2RX band, all tests specified in clauses A.4 and A.6 shall be tested using the antenna connection specified in clause A.3.6.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6.1.1.2.1-1 and table A.3.6.1.1.2.1-2

Table A.3.6.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection

Test case	SNR during T3 (dB)			
	Test 1	Test 2	Test 3	Test 4
A.4.5.1.1	-18	N/A	N/A	N/A
A.4.5.1.3	-18	N/A	N/A	N/A
A.4.5.1.5	-18	N/A	N/A	N/A
A.4.5.1.7	-18	N/A	N/A	N/A
A.5.5.1.1	-18	N/A	N/A	N/A
A.5.5.1.3	-18	N/A	N/A	N/A
A.5.5.1.5	-18	N/A	N/A	N/A
A.5.5.1.7	-18	N/A	N/A	N/A
A.6.5.1.1	-18	N/A	N/A	N/A
A.6.5.1.3	-18	N/A	N/A	N/A
A.6.5.1.5	-18	N/A	N/A	N/A
A.6.5.1.7	-18	N/A	N/A	N/A
A.7.5.1.1	-18	N/A	N/A	N/A
A.7.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.5	-18	N/A	N/A	N/A
A.7.5.1.7	-18	N/A	N/A	N/A

Table A.3.6.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

Test case	SNR during T3 (dB)		SNR during T4 (dB)	
	Test 1	Test 2	Test 1	Test 2
A.4.5.1.2	-18	N/A	-8	N/A
A.4.5.1.4	-18	N/A	-8	N/A
A.4.5.1.6	-18	N/A	-8	N/A
A.4.5.1.8	-18	N/A	-8	N/A
A.5.5.1.2	-18	N/A	-8	N/A
A.5.5.1.4	-18	N/A	-8	N/A
A.5.5.1.6	-18	N/A	-8	N/A
A.5.5.1.8	-18	N/A	-8	N/A
A.6.5.1.2	-18	N/A	-8	N/A
A.6.5.1.4	-18	N/A	-8	N/A
A.6.5.1.6	-18	N/A	-8	N/A
A.6.5.1.8	-18	N/A	-8	N/A
A.7.5.1.2	-18	N/A	-8	N/A
A.7.5.1.4	-18	N/A	-8	N/A
A.7.5.1.6	-18	N/A	-8	N/A
A.7.5.1.8	-18	N/A	-8	N/A

Table A.3.6.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection

Test case	SNR during T3 (dB)
	Test 1
A.4.5.5.1	-15
A.4.5.5.2	-15
A.4.5.5.3	-15
A.4.5.5.4	-15
A.5.5.5.1	-15
A.5.5.5.2	-15
A.5.5.5.3	-15
A.5.5.5.4	-15
A.6.5.5.1	-15
A.6.5.5.2	-15
A.6.5.5.3	-15
A.6.5.5.4	-15
A.7.5.5.1	-15
A.7.5.5.2	-15
A.7.5.5.3	-15
A.7.5.5.4	-15

A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.6.1.1.2.5 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the SCell antenna connection if an SCell is on band where 2RX is supported or the testing procedure in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell is on a band where 4RX is supported.

A.3.6.1.1.2.3 EN-DC tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.6 for the PCell antenna connection if the PCell is on a band where 2RX is supported or the antenna connection in A.3.6.1.1.2.7 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PSCell or SCell antenna connection if an SCell is on band where 2RX is supported or the testing procedure in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

A.3.6.1.1.2.4 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 Rx ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.5 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.6.1.1.2.1 and A.3.6.1.1.2.2, no test parameters or requirements are modified.

A.3.6.1.1.2.6 EN-DC LTE Antenna connection for bands where 2RX is supported

For bands where LTE 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 Rx ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.7 EN-DC LTE Antenna connection for bands where 4RX is supported

For bands where LTE 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, the default Downlink Antenna Configuration for NR FR2 cells is 1x2.

In case of Downlink Antenna Configuration 2x2 for NR FR2 cells, unless otherwise specified, the downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.

In both cases, the downlink signal is received assuming 2 UE baseband receivers. As the UE is tested following the Blackbox Approach with regard to the UE Rx antennas, the exact UE Rx antenna configuration is not relevant for the test configuration and has no impact on the test implementation.

A.3.7 EN-DC test setup

A.3.7.1 Introduction

A.3.7.2 E-UTRAN Serving Cell Parameters

A.3.7.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

Table A.3.7.2.1-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with all NR cells in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the NR carrier. The E-UTRA PCell shall configured to not interfere with NR operation and the E-UTRA PCell signal power shall not be critical to the test purpose.

Table A.3.7.2.1-1: E-UTRAN cell specific test parameters for tests with all NR cells in FR1

Parameter	Unit	E-UTRAN Cell1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}		5 MHz: N _{RB,c} = 25
		10 MHz: $N_{RB,c} = 50$
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
N. 6		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
PBCH_RA	dB	20 MHz: OP.7 TDD
PBCH_RB	dB dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104

Ê _s /N _{oc}	dB	17
Ê _s /l _{ot}	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
lo Note5	dBm/Ch BW	-59.13+10log(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be
- Note 5: E_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.3.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

Table A.3.7.2.2-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with one or more NR cells in FR2.

Table A.3.7.2.2-1: E-UTRAN cell specific test parameters for tests with one or more NR cells in FR2

Parameter	Unit	E-UTRAN Cell1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}	MHz	5 MHz: N _{RB,c} = 25
		10 MHz: $N_{RB,c} = 50$
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
OON O. P. (1) Note?		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD 20 MHz: OP.17 FDD
		5 MHz: OP.17 FDD
		5 MHz: OP.9 TDD 10 MHz: OP.1 TDD
		20 MHz: OP.1 TDD
PBCH_RA	dB	ZO WILIZ. OF .7 TOD
PBCH RB	dB	
PSS_RA	dB	0
SSS_RA	dB	Ĭ
PCFICH_RB	dB	

PHICH_RA	dB
PHICH_RB	dB
PDCCH_RA	dB
PDCCH_RB	dB
PDSCH_RA	dB
PDSCH_RB	dB
OCNG_RA ^{Note3}	dB
OCNG_RB ^{Note3}	dB

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: The E-UTRA signal is required only to ensure the E-UTRA link to the DUT in the EN-DC operation. The Test System shall provide a stable and noise-free E-UTRA signal without need of precise propagation modelling, path loss and polarization control. Further details of the E-UTRA signal configuration are not defined as part of the cell specific test parameters, since the E-UTRA link is not under performance verification and is not expected to influence the NR FR2 requirement.

A.3.7A NR FR1-FR2 test setup

Some Test cases in clause A.7 have NR cells in both FR1 and FR2. Unless otherwise stated within the test, the NR FR1 Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free NR FR1 signal without need of precise propagation modelling, path loss and polarization control. Further details of the NR FR1 signal configuration are not defined as part of the cell specific test parameters, since the NR FR1 link is not under performance verification and is not expected to influence the test purpose.

A.3.8 PRACH configurations

A.3.8.1 Introduction

This clause provides the typical PRACH configurations used for RRM test cases defined in Annex A. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.8.2 PRACH configurations in FR1

A.3.8.2.1 FR1 PRACH configuration 1

FR1 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR1.

Table A.3.8.2.1-1: Parameters for FR1 PRACH configuration 1

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed	
		configuration defined in table 6.3.3.2-2 and table 6.3.3.2-	
		3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL		
	carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based	
		and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence =	
		1.	
ssb-perRACH-OccasionAndCB-	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions	
PreamblesPerSSB		n48: 48 contention based preambles per SSB	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time	
		instance.	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined	
		in TS 38.331 [2].	
ra-ContentionResolutionTimer	sf48	48 sub-frames	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed	
		before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.2 FR1 PRACH configuration 2

FR1 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based noncontention based random access in FR1.

Table A.3.8.2.2-1: Parameters for FR1 PRACH configuration 2

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed	
		configuration defined in table 6.3.3.2-2 and	
		table 6.3.3.2-3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for	
		contention based and contention free	
		random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root	
		sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH	
. ==		occasions	
msg1-FDM	One	One PRACH transmission occasions	
D : 0:	IDO	FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120	1 (5)	
preambleTransMax	n6	Max number of RA preamble transmission	
ra-ResponseWindow	sl10	performed before declaring a failure is 6 10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321	
		[7].	
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE doesn't	
		use this field if is transmitting CFRA to	
		convey BFR.	
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE uses	
		this field only if is transmitting CFRA to	
		convey BFR	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -	
		105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.3 FR1 PRACH configuration 3

FR1 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR1.

Table A.3.8.2.3-1: Parameters for FR1 PRACH configuration 3

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed	
		configuration defined in table 6.3.3.2-2 and	
		table 6.3.3.2-3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for	
		contention based and contention free	
		random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root	
		sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH	
		occasions	
msg1-FDM	One	One PRACH transmission occasions	
		FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission	
		performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to	
		CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -	
		105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.4 FR1 PRACH configuration 4

FR1 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR1 to convey BFR.

Table A.3.8.2.4-1: Parameters for FR1 PRACH configuration 4

Field	Value	Comment	
prach-ConfigurationIndex	8	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n200	Max number of RA preamble transmission performed before declaring a failure is 200	
ra-ResponseWindow	sl1	1 slot	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 93	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3 PRACH configurations in FR2

A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR2.

Table A.3.8.3.1-1: Parameters for FR2 PRACH configuration 1

Field	Value	Comment	
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-4 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-OccasionAndCB- PreamblesPerSSB	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].	
ra-ContentionResolutionTimer	sf48	48 sub-frames	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS 38.321 [7].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3.2 FR2 PRACH configuration 2

FR2 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based noncontention based random access in FR2.

Table A.3.8.3.2-1: Parameters for FR2 PRACH configuration 2

Field	Value	Comment		
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH		
		periodicity, and other detailed configuration		
		defined in table 6.3.3.2-4 in TS 38.211 [6].		
msg1-SubcarrierSpacing	Same as UL carrier SCS			
totalNumberOfRA-Preambles	48	Total number of preambles used for		
		contention based and contention free		
		random access		
numberOfRA-PreamblesGroupA	48	No group B.		
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root		
1 240110		sequence = 1.		
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH		
most FDM	One	occasions One PRACH transmission occasions		
msg1-FDM	One	FDMed in one time instance.		
powerRampingStep	dB2	FDIVIEG III OHE UITIE IIIStatice.		
preambleReceivedTargetPower	dBm-120			
preambleTransMax	n6	Max number of RA preamble transmission		
predmiliorranowax	110	performed before declaring a failure is 6		
ra-ResponseWindow	sl10	10 slots		
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23		
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS		
		38.321 [7].		
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't		
		use ssb-ResourceList and BFR-SSB-		
		Resource IEs at the same time. UE doesn't		
		use this field if is transmitting CFRA to		
		convey BFR.		
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't		
		use ssb-ResourceList and BFR-SSB-		
		Resource IEs at the same time. UE uses		
		this field only if is transmitting CFRA to		
		convey BFR		
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed		
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -		
		105dBm, as defined in TS 38.331 [2].		
Note: For further information see clause 6.3.2 in TS 38.331 [2].				

A.3.8.3.3 FR2 PRACH configuration 3

FR2 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random acces
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission
		performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]].

A.3.8.3.4 FR2 PRACH configuration 4

 $FR2\ PRACH\ configuration\ 4\ in\ this\ clause\ provides\ the\ PRACH\ configuration\ for\ CSI-RS\ based\ non-contention\ based\ random\ access\ in\ FR2\ to\ convey\ BFR.$

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n200	Max number of RA preamble transmission
		performed before declaring a failure is 200.
ra-ResponseWindow	sl40	40 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]].

A.3.9 BWP configurations

A.3.9.1 Introduction

This clause provides the typical BWP configurations used for RRM test cases defined in Annex A. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.3. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.9.2 Downlink BWP configurations

A.3.9.2.1 Initial BWP

Table A.3.9.2.1-1: Downlink BWP patterns for initial BWP configuration

BWP Parameters	Unit		Values	
Reference BWP		DLBWP.0.1	DLBWP.0.2	
Starting PRB index		0	RBa Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	
Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RB _J , RB _{J+}	B _{J+1} ,, RB _{J+19}) which is defined in Clause A.3.10.			

A.3.9.2.2 Dedicated BWP

Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3
Starting PRB index		0	RB _b Note 1	RBa Note 2
Bandwidth	RB	Same as RF	25 for SCS =	25 for SCS =
		channel defined	15KHz,	15KHz,
		in each test	51 for SCS =	51 for SCS =
			30KHz,	30KHz,
			32 for SCS =	32 for SCS =
			120KHz	120KHz
Note 1: RBb is the	the lowest PRB index to guarantee the BWP not fully overlapped with SSB			
PRB index	(RB _J , R	RBJ, RBJ+1,, RBJ+19) which is defined in Clause A.3.10.		
Note 2: RB _a is the	lowest F	PRB index to guarantee the BWP including SSB PRB index		
(RB _J , RB _J	₊1,, RI	3 _{J+19}) which is defined	d in Clause A.3.10.	

A.3.9.3 Uplink BWP configurations

A.3.9.3.1 Initial BWP

Table A.3.9.3.1-1: Uplink BWP patterns for initial BWP configuration

BWP Parameters	Unit		Values	
Reference BWP		ULBWP.0.1	ULBWP.0.2	
Starting PRB index		0	RB _a Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	
Note 1: RBa is the	1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index			
(RB _J , RB _J	(RB _J , RB _{J+1} ,, RB _{J+19}) which is defined in Clause A.3.10.			

A.3.9.3.2 Dedicated BWP

Table A.3.9.3.2-1: Uplink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit		Values	
Reference BWP		ULBWP.1.1	ULBWP.1.2	ULBWP.1.3
Starting PRB index		0	RB _b Note 1	RB _a Note 2
Bandwidth	RB	Same as RF channel defined in each test	25 for SCS = 15KHz, 51 for SCS = 30KHz, 32 for SCS = 120KHz	25 for SCS = 15KHz, 51 for SCS = 30KHz, 32 for SCS = 120KHz
		RB _{J+1} ,, RB _{J+19}) which is defined in Clause A.3.10.		
Note 2: RBa is the	Iowest F	PRB index to guarantee the BWP including SSB PRB index		
(RBJ, RBJ	+1,, RI	B _{J+19}) which is define	d in Clause A.3.10.	

A.3.10 SSB Configurations

A.3.10.1 SSB Configurations for FR1

A.3.10.1.1 SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.1-1: SSB.1 FR1: SSB Pattern 1 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values	
Channel bandwidth	10 MHz	
SSB SCS	15 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 2	2-5	
Slot numbers containing SSB Note 2 0		
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)Note 1		
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.2-1: SSB.2 FR1: SSB Pattern 2 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values
Channel	bandwidth	40 MHz
SSB SCS	6	30 kHz
SSB peri	odicity (Tssb)	20 ms
Number of	of SSBs per SS-burst	1
SS/PBCH	d block index	0
	numbers containing SSB Note 3	4-7 or 2-5 Note 2
Slot num	bers containing SSB Note 3	0
SFN conf	taining SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$
RB numbers containing SSB within channel BW (RB		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}
Note 1: RBs containing SSB can be configured in any frequency location within the contained bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		chronization raster defined in
Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the curr band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-chosen.		
Note 3: These values have been derived from other parameters for information (as per TS 38.213 [3]). They are not settable parameters themselves		

A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.3-1: SSB.3 FR1: SSB Pattern 3 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Valı	ues	
Channel bandwidth	10 MHz	10 MHz	
SSB SCS	15 kHz		
SSB periodicity (Tssb)	20 ms		
Number of SSBs per SS-burst	2		
SS/PBCH block index	0	1	
Symbol numbers containing SSB Note 2	2-5	8-11	
Slot numbers containing SSB Note 2	0	0	
SFN containing SSB	SFN mod (max(Tss	в,10ms)/10ms) = 0	
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB	J+19) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other paramete purposes (as per TS 38.213 [3]). They are not settable			

A.3.10.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.4-1: SSB.4 FR1: SSB Pattern 4 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Val	ues
Channel	bandwidth	40 MHz	
SSB SCS	3	30 kHz	
SSB peri	odicity (T _{SSB})	20 ms	
Number	of SSBs per SS-burst	2	
SS/PBCI	H block index	0	1
Symbol r	numbers containing SSB Note 3	4-7 or 2-5 Note 2	8-11
Slot numbers containing SSB Note 3		0	0
SFN containing SSB		SFN mod (max(Tssi	3,10ms)/10ms) = 0
RB numbers containing SSB within channel BW		(RB _J , RB _{J+1} ,, RB _s	J+19)Note 1
Note 1: RBs containing SSB can be configured		in any frequency loca	tion within the cell
bandwidth according to the allowed synchronization raster defined in		efined in	
	TS 38.104 [13].		
Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should		ern Case B should be	used for the current

band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.

Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.

A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MHz

Table A.3.10.1.5-1: SSB.5 FR1: SSB Pattern 5 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values	
Channel bandwidth	10 MHz	
SSB SCS	15 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 2	2-5	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$	
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the		
bandwidth according to the allowed synchronization raster defined in TS		
38.104 [13].		
Note 2: These values have been derived from other parameters for information		
purposes (as per TS 38.213 [3]). They are not settable parameters themselve		

A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MHz

Table A.3.10.1.6-1: SSB.6 FR1: SSB Pattern 6 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values	
Channel bandwidth		40 MHz	
SSB SCS		30 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		1	
SS/PBCH block index		0	
Symbol numbers containing SSB Note 3		4-7 or 2-5 Note 2	
Slot numbers containing SSB Note 3 0		0	
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$	
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19) ^{Note 1}		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2:	2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.		
Note 3:	These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2 SSB Configurations for FR2

A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	
Channel bandwidth		100 MHz	
SSB SCS		120 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		2	
SS/PBCH block index		0	1
Symbol numbers containing SSBs Note 2		4-7	8-11
Slot numbers containing SSB Note 2		0	0
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1:	ote 1: RBs containing SSB can be configured in any frequency location within the cell		
	bandwidth according to the allowed synch		
Note 2:	Note 2: These values have been derived from other parameters for information purpo		
per TS 38.213 [3]). They are not settable parameters themselves.			s.

A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Values		
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity (T _{SSB})	20 ms		
Number of SSBs per SS-burst	2		
SS/PBCH block index	0	1	
Symbol numbers containing SSBs Note 2	8-11	12-13	0-1
Slot numbers containing SSB Note 2	0	0	1
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13]. Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.3-1: SSB.3 FR2: SSB Pattern 3 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SS	BB Parameters	Values	
Channel bandwidth		100 MHz	
SSB SCS		120 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		1	
SS/PBCH block index		0	
Symbol numbers containing SSBs Note 2		4-7	
Slot numbers containing SSB Note 2		0	
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19)Note		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
	1: RBs containing SSB can be configured in any frequency location within the cell		
bandwid	th according to the allowed sync	hronization raster defined in TS 38.104 [13].	
Note 2: These values have been derived from other parameters for information purpose			
per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values		
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity (T _{SSB})	20 ms		
Number of SSBs per SS-burst	1		
SS/PBCH block index	0		
Symbol numbers containing SSBs Note 2	8-11		
Slot numbers containing SSB Note 2	0		
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}		
	3		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13]. Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	
Channel bandwidth		100 MHz	
SSB SCS		120 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		2	
SS/PBCH block index		2	3
Symbol numbers containing SSBs Note 2		2-5	6-9
Slot numbers containing SSB Note 2		1	1
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19) ^{Note 1}			+19) ^{Note 1}
Note 1:	e 1: RBs containing SSB can be configured in any frequency location within the cell		
	bandwidth according to the allowed syncl	nronization raster defin	ed in TS 38.104 [13].
Note 2: These values have been derived from other parameters for information purport per TS 38.213 [3]). They are not settable parameters themselves.			rmation purposes (as
			es.

A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Values		
Channel bandwidth	100 MHz		
SSB SCS	240 kHz	240 kHz	
SSB periodicity (T _{SSB})	20 ms		
Number of SSBs per SS-burst	2	2	
SS/PBCH block index	2 3		
Symbol numbers containing SSBs Note 2	2-5 6-9	9	
Slot numbers containing SSB Note 2	1 1		
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}		
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
	These values have been derived from other parameters for information purposes (as		
per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

	SSB Parameters	Values	
Channel	bandwidth	100 MHz	
SSB SCS	S	120 kHz	
SSB peri	iodicity (T _{SSB})	20 ms	
Number	of SSBs per SS-burst	1	
SS/PBCI	H block index	1	
Symbol numbers containing SSBs Note 2		8-11	
Slot numbers containing SSB Note 2		0	
SFN containing SSB SFN mod (max(T _{SSB} ,10ms)/10ms		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numb	pers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in TS 38.104 [1			
Note 2: These values have been derived from other parameters for information purposes			
per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Para	meters	Val	ues	
Channel bandwidth		100 MHz		
SSB SCS		240 kHz		
SSB periodicity (T _{SSB})		20 ms		
Number of SSBs per SS-bu	ırst	1		
SS/PBCH block index		1		
Symbol numbers containing		12-13	0-1	
Slot numbers containing SSB Note 2		0	1	
SFN containing SSB		SFN mod (max(T _{SSB} ,	10ms)/10ms) = 0	
RB numbers containing SS	Bs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+}	19)Note 1	
Note 1: RBs containing SSB can be configured in any frequency location within the cell				
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].				
Note 2: These values have been derived from other parameters for information purposes (a			mation purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.				

A.3.11 SMTC Configurations

A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.1-1: SMTC.1: SMTC Pattern 1 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.2-1: SMTC.2: SMTC Pattern 2 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	5 ms

A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms

Table A.3.11.3-1: SMTC.3: SMTC Pattern 3 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	160 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.4-1: SMTC.4: SMTC Pattern 4 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	1 ms

A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.4-1: SMTC.5: SMTC Pattern 5 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values	
SMTC periodicity	20 ms	
SMTC offset	10 ms	
SMTC duration	5 ms	

A.3.12 Test Cases with Different CC Configurations

A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations

A.3.12.1.1 Introduction

In Annex A EN-DC test cases may be defined for two component carriers (CCs) as well as for more than two CCs to verify the same RRM requirement.

A.3.12.1.2 Principle of testing

If multiple EN-DC test cases are defined for two CCs as well as for more than two CCs to verify the same type of RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with the maximum number of CCs in EN-DC supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with two CCs in EN-DC supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations

A.3.12.2.1 Introduction

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

A.3.12.2.2 Principle of testing

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with the maximum number of CCs in CA supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with at least two CCs in CA supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in CA would depend on the test equipment capability.

A.3.13 Test Cases in SA and EN-DC Operations

A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

Editor's note: this clause may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.

A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and

- verifies at least all RRM requirements covered in the test case(s), which is not performed.

A.3.14 CSI-RS configurations

A.3.14.1 FDD

Table A.3.14.1-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 FDD	CSI-RS.1.2 FDD	CSI-RS.1.3 FDD	CSI-RS.1.4 FDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		10 for resource #0	20 for resource #0	30 for resource #0 31 for resource #1 32 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0			33 for resource #3 34 for
		11 for resource #1	21 for resource #1	resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot5	slot10	n.a.	n.a.
Offset	1	1	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
firstOFDMSymbolInTimeDomain	5 for resource #0	6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
		10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6

				7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

A.3.14.2 TDD

Table A.3.14.2-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 TDD	CSI-RS.1.2 TDD	CSI-RS.1.3 TDD	CSI-RS.1.4 TDD	
Resource Type	periodic	periodic	aperiodic	aperiodic	
Resource Set Config					
nzp-CSI-ResourceSetId	0	0	0	0	
repetition	n.a.	off	off	on	
aperiodicTriggeringOffset	n.a.	n.a.	6	6	
trs-Info	n.a.	n.a.	n.a.	n.a.	
Resource Config					
				30 for resource #0 31 for	
		10 for resource #0	20 for resource #0	resource #1 32 for resource #2 33 for resource #3	
nzp-CSI-RS-ResourceId	0 for resource #0	11 for resource #1	21 for resource #1	34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7	
powerControlOffset	0	0	0	0	
powerControlOffsetSS	db0	db0	db0	db0	
scramblingID	0	0	0	0	
Period (slots)	slot5	slot10	n.a.	n.a.	
Offset	1	1	n.a.	n.a.	
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.	
frequencyDomainAllocation	000001	000001	000001	000001	
nrofPorts	2	1	1	1	
				0 for resource #0 1 for resource	
firstOFDMSymbolInTimeDomain	5 for resource #0	5 for resource #0	6 for resource #0	6 for resource #0	#1 2 for resource #2 3 for resource
		10 for resource #1	10 for resource #1	#3 4 for resource #4 5 for resource #5	

				6 for resource #6
				7 for resource
				#7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

Table A.3.14.2-2: CSI-RS Reference Measurement Channels for SCS=30kHz

	CSI-RS.2.1 TDD	CSI-RS.2.2 TDD	CSI-RS.2.3 TDD	CSI-RS.2.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
				30 for resource #0 31 for
		10 for resource #0	20 for resource #0	resource #1 32 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0			33 for resource #3
nzp-coi-resourceia	0 for resource #0	11 for resource #1	21 for resource #1	34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot10	slot20	n.a.	n.a.
Offset	2	2	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
			6 for resource #0	0 for resource #0
		6 for resource #0		1 for resource #1
firstOFDMSymbolInTimeDomain	5 for resource #0	2 101 10004100 110		2 for resource #2
	5 for resource #0			3 for resource #3
		40 5	10 for resource #1	4 for resource #4
		10 for resource #1	TO TOLLIESOUICE #1	5 for resource #5

				6 for resource #6
				7 for resource
				#7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

Table A.3.14.2-3: CSI-RS Reference Measurement Channels for SCS=120kHz

	CSI-RS.3.1 TDD	CSI-RS.3.2 TDD	CSI-RS.3.3 TDD	CSI-RS.3.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
				30 for resource #0 31 for resource #1
		10 for resource #0	20 for resource #0	32 for resource #2 33 for resource #3
nzp-CSI-RS-ResourceId	0 for resource #0	11 for resource #1	21 for resource #1	34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot40	slot80	n.a.	n.a.
Offset	8	8	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
				0 for resource #0 1 for resource #1
firstOFDMSymbolInTimeDomain	5 for resource #0	6 for resource #0	6 for resource #0	2 for resource #2 3 for resource #3
		10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5

				6 for resource #6
				7 for resource
				#7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases in clause A.5 and A.7. The applicable AoA setup is defined in each test case in clause A.5 and A.7.

A.3.15.1 Setup 1: Single AoA in Rx beam peak direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table 3.15.3-1: Set of relative angular offsets between active probes for each power class

UE Power class	Relative angular offset between active probes
1	FFS
2	FFS
3	30°, 60°, 90°, 120° and 150°
4	FFS

A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak

A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the non Rx beam peak signal shall not be changed between test iterations.

A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class.

For UE power class 3, the relative angular offset between the directions (AoAs) of the 2 active probes shall be changed for each test iteration, within the probe alignment described above. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

A.3.16 TCI State Configuration

A.3.16.1 Introduction

This clause provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this clause are configured in each test when applicable to indicate that certain DL signals are QCL'ed with the referenceSignal configured in the TCI states.

considered as resource set 1.

A.3.16.2 TCI states

Table A.3.16.2-1: TCI States

Parameter	TCI.State.0	TCI.State.1	TCI.State.2	TCI.State.3		
tci-StateId	ld0	ld1	ld2	ld3		
qcl-Type1	typeC	typeC	typeA	typeA		
qcl-Type2 ^{Note1}	typeD	typeD	typeD	typeD		
referenceSigna	I SSB0	SSB1	Resource #4 in TRS resource set 1 Note3	Resource #4 in TRS resource set 2 Note3		
Note 1: qcl-Type2 of typeD only where applicable. For RRM test cases, this will be only in FR2 Note 2: referenceSignal configurations towards which the TCI states are configured are defined in a test-						
specific manner. Note 3: Reference TRS resource sets are defined in A.3.17, and the applicable TRS resource set(s) are specified in each test case. When a single TRS resource set is configured in a test case, it is						

Table A.3.16.2-2: Void

A.3.17 Configurations of CSI-RS for tracking

A.3.17.1 Configuration of CSI-RS for tracking for FR1

A.3.17.1.1 FDD

Table A.3.17.1.1-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value
Reference channel		TRS.1.1 FDD
Bandwidth		BW of Active BWP ^{Note 1}
SCS	kHz	15
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2
C3I-R3 Oliset	SIOIS	11 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3Note 2
TCI state		TCI.State.0
Note 1: BW of TRS is configured sam	e as the	BW size of UE active BWP in the RRM test cases
Note 2: Unless otherwise specified in	the test	case

Table A.3.17.1.1-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value
Reference channel		TRS.1.2 FDD
Bandwidth		BW of Active BWP ^{Note 1}
SCS	kHz	30
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		l ₀ = 5 for CSI-RS resource 1 and 3
CSI-RS		l ₀ = 9 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4
CSI-RS offset	alata	20 for CSI-RS resource 1 and 2
CSI-RS offset	slots	21 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3 ^{Note 2}
TCI state		TCI.State.0
Note 1: BW of TRS is configured sam	e as the	BW size of UF active BWP in the RRM test cases

Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases

Note 2: Unless otherwise specified in the test case

A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value	
Reference channel		TRS.1.1 TDD	
Bandwidth		BW of Active BWP ^{Note 1}	
SCS	kHz	15	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3	
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2	
CSI-RS dilset	SIOIS	11 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	-3 ^{Note 2}	
TCI state		TCI.State.0	
Note 1 BW of TRS is configured same	e as the	BW size of UE active BWP in the RRM test cases	
Note 2: Unless otherwise specified in the test case			

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value
Reference channel		TRS.1.2 TDD
Bandwidth		BW of Active BWP ^{Note 1}
SCS	kHz	30
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	20 for CSI-RS resource 1 and 2 21 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3 ^{Note 2}
TCI state		TCI.State.0
Note 1: BW of TRS is configured same	e as the	BW size of UE active BWP in the RRM test cases
Note 2. Unless otherwise specified in	the test	225

Note 2: Unless otherwise specified in the test case

A.3.17.2 Configuration of CSI-RS for tracking for FR2

A.3.17.2.1 TDD

Table A.3.17.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1

Parameter	Unit	Value	
Reference channel		TRS.2.1 TDD	
Bandwidth		BW of Active BWP ^{Note 1}	
SCS	kHz	120	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		I ₀ = 1 for CSI-RS resource 1 and 3	
CSI-RS		l ₀ = 5 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2	
COI-ICO Oliset	31013	41 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	-3 ^{Note 2}	
TCI state		TCI.State.0	
Note 1: BW of TRS is configured same	Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		
Note 2: Unless otherwise specified in t	he test o	case	

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

Parameter	Unit	Value
Reference channel		TRS.2.2 TDD
Bandwidth		BW of Active BWP ^{Note 1}
SCS	kHz	120
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I ₀ = 2 for CSI-RS resource 1 and 3
CSI-RS		l ₀ = 6 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2 41 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3 ^{Note 2}
TCI state		TCI.State.1
Note 1: BW of TRS is configured same	e as the	BW size of UE active BWP in the RRM test cases

Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases

Note 2: Unless otherwise specified in the test case

A.3.18 Additional definitions related to OTA testing for FR2 RRM test cases

A.3.18.1 Introduction

FR2 RRM test cases are performed over the air (OTA). This clause provides additional definitions and clarifications on the OTA measurements and metrics defined or refered in the test cases.

A.3.18.2 PRACH Power Measurement

PRACH power is measured as EIRP(Link=Link angle, Meas=Link angle) as defined in clause 3.1 of TS 38.101-2 [19].

A.4 EN-DC tests with all NR cells in FR1

A.4.1 Void

A.4.2 Void

A.4.3 RRC_CONNECTED state mobility

A.4.3.1 Void

A.4.3.2 RRC Connection Mobility Control

A.4.3.2.1 Void

A.4.3.2.2 Random Access

A.4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.1.1-1. UE capble of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.1.1-2.

Table A.4.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell in EN-DC

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE	
	capability		

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

Paramet	Parameter		Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 3 in FR1	As defined in A.3.10
	Config 3,4		SSB pattern 4 in FR1	
Duplex Mode for Cell 2	Config 1,2		FDD	

		Config 3,4		TDD	
TDD Configu	ration	Config 3,4		TDDConf.2.1	
OCNG Patter				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parai	meters	Config 1,2		SR.1.1 FDD	As defined in A.3.1.1.
Note 4		Config 3,4	_	SR.2.1 TDD	
NR RF Chanr	nel Numbe	r		1	
EPRE ratio of	PSS to SS	SS	dB		
EPRE ratio of			dB		
		PBCH_DMRS	dB		
		DMRS to SSS	dB	0	
		D PDCCH_DMRS	dB		
		DMRS to SSS	dB		
EPRE ratio of	PDSCH to	PDSCH_DMRS	dB		
000	\hat{E}_s/I_{ot}		dB	3	Power of SSB with index
SSB with index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	0 is setto be above configured rsrp-
middx o	1 oc	Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	
	\hat{E}_s/I_{ot}		dB	-17	Power of SSB with index
SSB with index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	1 is set to be below configured rsrp-
middx i	1 oc	Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	
In Note 2	•	Config 1,2	dBm	-65.3/9.36MHz	For symbols without SSB
10 11002	Config 3,4			-62.2/38.16MHz	index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured UE transmitted power (dBm	23	As defined in clause	
$P_{\mathrm{CMAX, f, c}}$)					6.2.4 in TS 38.101-1.
PRACH Configuration			FR1 PRACH configuration 1	As defined in A.3.8.2.	
Propagation (Condition		-	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.4.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission..

A.4.3.2.2.1.2.5 void

A.4.3.2.2.1.2.6 void

A.4.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.4.3.2.2.2 Non-contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.2.1-1. UE capble of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.4.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell in EN-DC

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only recapability	equired to be tested in one of the supported test configurations depending on UE	

Table A.4.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

Paramet	Parameter		Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB pattern 3 in	SSB pattern 3 in	As defined in A.3.10
			FR1	FR1	
	Config 3,4		SSB pattern 4 in	SSB pattern 4 in	
			FR1	FR1	
CSI-RS Configuration	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
	Config 3,4			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode for Cell 2	Config 1,2		FDD	FDD	
	Config 3,4		TDD	TDD	
TDD Configuration	Config 3,4		TDDConf.2.1	TDDConf.2.1	

OCNG Pattern Note 1			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.	
PDSCH parar	meters	Config 1,2		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 3,4	1	SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
NR RF Chanr	nel Numbe	r		1	1	
EPRE ratio of	PSS to S	SS	dB			
EPRE ratio of	PBCH_DI	MRS to SSS	dB			
EPRE ratio of	PBCH to	PBCH_DMRS	dB			
EPRE ratio of	PDCCH_I	DMRS to SSS	dB	0	0	
EPRE ratio of	PDCCH to	PDCCH_DMRS	dB			
EPRE ratio of	PDSCH_I	DMRS to SSS	dB			
EPRE ratio of	PDSCH to	PDSCH_DMRS	dB			
SSB with	\hat{E}_s/I_{ot}		dB	3	3	Power of SSB with
index 0	N _{oc} Config 1,2		dBm/15kHz	-98	-98	index 0 is set to be above configured
	1 oc	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	-95	
SSB with	\hat{E}_s/I_{ot}		dB	-17	-17	Power of SSB with
index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	index 1 is set to be below configured
	1 voc	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}	1	dB	-17	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	-
Io Note 2		Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 11010 2		Config 3,4		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured UE transmitted power (dBm	23	23	As defined in clause	
$P_{\mathrm{CMAX, f, c}}$)					6.2.4 in TS 38.101- 1.	
PRACH Configuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.	
Propagation (Condition		-	AWGN	AWGN	7 1.0.0.2.

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.3 Void

A.4.4 Timing

A.4.4.1 UE transmit timing

A.4.4.1.1 NR UE Transmit Timing Test for FR1

A.4.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 4.4.1.1.1-1.

Configuration	Description
1	LTE FDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	LTE FDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	LTE FDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
4	LTE TDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
5	LTE TDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
6	LTE TDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.4.4.1.1.1-1: Supported test configurations for FR1 PSCell

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Table A.4.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.4.4.1.1.1-3.

Table A.4.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2,3,4,5,6	Freq1	Freq1	
Duplex Mode		1,4	F	DD	
Duplex Mode		2,3,5,6	TDD		
		1,4	Not App	plicable	
TDD configuration		2,5	TDDC	onf.1.1	
		3,6	TDDC	onf.1.2	
		1,4	10: N _{RI}	B,c = 52	
BW _{channel}	MHz	2,5	10: N _{RI}	B,c = 52	
		3,6	40: N _{RB}	,c = 106	
Initial BWP Configuration		1,2,3,4,5,6	DLBW ULBW		
Dedicated BWP Configuration		1,2,3,4,5,6	DLBWP.1.1 ULBWP.1.1		
DRx Cycle	ms	1,2,3,4,5,6	N/A	DRX.5 ^{Note5}	
PDSCH Reference		1,4	SR.1.1 FDD		
measurement channel		2,5	SR.1.1 TDD		
medearement enamer		3,6	SR.2.	1 TDD	
CORESET Reference		1,4	CR.1.	1 FDD	
Channel		2,5	CR.1.1 TDD]
		3,6	CR.2.1 TDD		1
OCNG Patterns		1,2,3,4,5,6	OCNG p	oattern 1	
		1,4	SSB.	1 FR1	
SSB configuration		2,5	SSB.	1 FR1	
		3,6	SSB.2 FR1		
SMTC configuration		1,2,3,4,5,6		ΓC.2	
		1,4	TRS.1.		
TRS configuration	<u> </u>	2,5	TRS.1.		
		3,6	TRS.1.	.2 TDD	
PDSCH/PDCCH	kHz	1,2,4,5	1	5	
subcarrier spacing	NI IZ	3,6	3	0	

EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	1,2,3,4,5,6	0	0	
$N_{\!oc}^{\!$	dBm/15 kHz	1,2,3,4,5,6	-98	-98	
N_{OC}^{Note2}	dBm/SCS	1,2,4,5	-98	-98	
- oc	ubili/303	3,6	-95	-95	
\hat{E}_{s}/I_{ot}		1,2,3,4,5,6	3	3	
\hat{E}_s/N_{oc}		1,2,3,4,5,6	3	3	
SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-95	-95	
	ubili/SCS	3,6	-92	-92	
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	-65.2	-65.2	
	dBm/38.1MHz	3,6	-59.2	-59.2	
Propagation condition		1,2,3,4,5,6	AW		
SRS Config		1,2,4,5	SRSConf.1 ^{Note6}	SRSConf.3 ^{Note6}	
		3, 6	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: DRx related parameters are given in Table A.3.3.5-1

Note 6: SRS configs are given in Table A.4.4.1.1.1-3

Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	

resourceMapping startPosition	0	0	0	
resourceMapping nrofSymbols	n1	n1	n1	
resourceMapping repetitionFactor	n1	n1	n1	
freqDomainPosition	0	0	0	
freqDomainShift	0	0	0	
freqHopping c-SRS	14 for test configuration 1,2,4,5 25 for test configuration 3,6	25	14	Matches N _{RB,c}
freqHopping b-SRS	0	0	0	
freqHopping b-hop	0	0	0	
groupOrSequenceHopping	Neither	Neither	Neither	
resourceType	Periodic	Periodic	Periodic	
periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
sequenceld	0	0	0	Any 10 bit number

A.4.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.4.4.1.1.2-1

Table A.4.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
15	+64*64Tc	+32*64T _c	
30	+32*64T _c	+16*64T _c	

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.

5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.4.4.2 UE timer accuracy

A.4.4.3 Timing advance

A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

A.4.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.4.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.4.4.3.1.2-1: Timing advance supported test configurations

С	onfig	Description		
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	Note: The UE is only required to be tested in one of the supported test configurations			

Table A.4.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new} = N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192*T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.4.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter		Unit	Tes	st1		
		Unit	T1	T2		
Dunley made	Config 1,4		FC	DD		
Duplex mode	Config 2,3,5,6		TC	DD		
	Config 1,4		Not App	olicable		
TDD configuration	Config 2,5		TDDCc	onf.1.1		
	Config 3,6		TDDConf.2.1			
	Config 1,4		10: N _{RB,c} = 52			
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52			
	Config 3,6		40: N _{RB,c} = 106			
	Config 1,4		10: N _{RB,c} = 52			
BWP BW	Config 2,5	MHz	10: N _{RB,c} = 52			
	Config 3,6		40: $N_{RB,c} = 106$			
DRx Cycle		ms	Not Applicable			
PDSCH Reference	Config 1,4		FDD			
measurement channel	Config 2,5		SR.1.1 TDD			
measurement channel	Config 3,6		SR2.1 TDD			
CORESET Reference	Config 1,4	CR.1.1 FDD				
Channel	Config 2,5		CR.1.1	TDD		

		Config 3,6		CR2.1 TDD
Config 1,4		Config 1,4		TRS.1.1 FDD
TRS configuration	Config 2,5	j	TRS.1.1 TDD	
		Config 3,6	j	TRS.1.2 TDD
OCNG Pat	tterns			OCNG pattern 1
CMTC	£:	Config 1,2,4,5		SMTC.1 FR1
SMTC con	iliguration	Config 3,6		SMTC.2 FR1
PDSCH/PI	DCCH	Config 1,2,4,5	1.1.1-	15 kHz
subcarrier	spacing	Config 3,6	kHz	30 kHz
PUCCH/PI	USCH	Config 1,2,4,5	Isl I=	15 kHz
subcarrier	spacing	Config 3,6	kHz	30 kHz
EPRE ratio	o of PSS to S	SSS		
EPRE ratio	of PBCH D	MRS to SSS		
EPRE ratio	of PBCH to	PBCH DMRS		
EPRE ratio	of PDCCH	DMRS to SSS		
EPRE ratio	of PDCCH	to PDCCH DMRS	4D	0
EPRE ratio	of PDSCH	DMRS to SSS	- dB	0
EPRE ratio	of PDSCH	to PDSCH		
EPRE ratio	of OCNG D	MRS to SSS(Note 1)		
EPRE ratio	of OCNG to	OCNG DMRS (Note		
1)				
N_{oc} Note2			dBm/15kH	-98
1 v oc			Z	-90
$N_{\it oc}$ Note2	Config 1,2,	4,5		-98
1 voc	Config 3,6		dBm/SCS	-95
\hat{E}_s/I_{ot}			dB	3
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		dB	3
Io ^{Note3}	Config 1,2,4,5		dBm/ 9.36MHz	-67.57
Config 3,6			dBm/ 38.16MHz	-62.58
Propagation	on condition		-	AWGN
Note 1:	OCNC shall	he used such that both	colle are fully	allocated and a constant total transmitted nower spectral

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

	Field		Value	Comment
	c-SRS	Config 1,2,4,5	12	Fraguency hopping is disabled
1	U-0NO	Config 3,6	24	Frequency hopping is disabled

b-SRS	0					
b-hop	0					
freqDomainPosition	0	Frequency domain position of SRS				
freqDomainShift	0					
groupOrSequenceHopping	neither	No group or sequence hopping				
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots				
nothloss Reference RC	ssb-Index=0	SSB #0 is used for SRS path loss				
pathlossReferenceRS	SSD-ITIUEX=U	estimation				
usage	Codebook	Codebook based UL transmission				
startPosition	0	resourceMapping setting. SRS on last				
nrofSymbols	n1	symbol of slot, and 1symbols for SRS				
repetitionFactor	n1	without repetition.				
combOffset-n2	0	transmission Comb setting				
cyclicShift-n2	0	transmissionComb setting				
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission				
Note: For further information see clause 6.3.2 in TS 38.331 [2].						

A.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.4.5 Signaling characteristics

A.4.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.1.1-1. The test parameters are given in Tables A.4.5.1.1.1-2, A.4.5.1.1.1-3, and A.4.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.1.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and insync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Configuration Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 2 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 The UE is only required to pass in one of the supported test configurations in FR1 Note:

Table A.4.5.1.1.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3, 4,		DLBWP.0.1
configuration	5, 6		DEBWI .0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1

CORESET		Config 1, 4		CR.1.1 FDD
Reference Cri	annei	Config 2, 5		CR.1.1 TDD
000.0	- ('	Config 3, 6		CR.2.1 TDD
SSB Configur	ation	Config 1, 4		SSB.1 FR1
		Config 2, 5		SSB.1 FR1
01470 0 "	.,	Config 3, 6		SSB.2 FR1
SMTC Config	uration	Config 1, 2, 4, 5		SMTC.1
		Config 3, 6		SMTC.1
PDSCH/PDC0		Config 1, 2, 4, 5		15 kHz
subcarrier spa	acing	Config 3, 6		30 kHz
PRACH		Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration		Config 3, 6		Table A.3.8.2.1-1
SSB index as:		is RLM RS		0
OCNG param	eters			OP.1
CP length				Normal
Correlation Ma		l Antenna		2x2 Low
Configuration				
Out of sync	DCI fo			1-0
transmission		er of Control OFDM		2
parameters	symbo			
		gation level	CCE	8
		of hypothetical	dB	4
		H RE energy to		
		ge SSS RE energy		
		of hypothetical	dB	4
		H DMRS energy to		
		ge SSS RE energy		
		precoder		REG bundle size
	granul	arity		
	REG b	oundle size		6
DRX				OFF
Gap pattern II				gp0
Layer 3 filterin	ng			Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CS	SI	Config 1, 4		CSI-RS.1.1 FDD
reporting		Config 2, 5		CSI-RS.1.1 TDD
		Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tra	cking	Config 1, 4		TRS.1.1 FDD
		Config 2, 5		TRS.1.1 TDD
		Config 3, 6		TRS.1.2 TDD
T1				0.2
T2			S	0.48
T3	0.48			
D1			S S	0.44
	configur	ations are assigned	to the UE	prior to the start of time
		PDCCH is not trans	mitted afte	or T1 starts
Note 2: UE-specific PDCCH is not transmitted after T1 starts. Note 3: E-UTRAN is in non-DRX mode under test.				
Note 5. L-0 I RAIN IS III HUII-DRA HIUUE UHUEI LESU.				

Table A.4.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3

EPRE ratio of P	DCCH DMRS to SSS	dB		4	
EPRE ratio of P	EPRE ratio of PDCCH to PDCCH			0	
DMRS					
EPRE ratio of P	BCH DMRS to SSS	dB			
EPRE ratio of P	BCH to PBCH DMRS	dB			
EPRE ratio of P	SS to SSS	dB			
EPRE ratio of P	DSCH DMRS to SSS	dB		0	
EPRE ratio of P	DSCH to PDSCH	dB			
DMRS					
EPRE ratio of O	CNG DMRS to SSS	dB			
EPRE ratio of O	CNG to OCNG DMRS	dB			
SNR on RLM-	Config 1, 4	dB	1	-7	-15
RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
SNR on other					
channels and	Config 1, 2, 3, 4, 5, 6	dB		1	
signals					
N_{oc}	Config 1, 4	dBm/		-98	
1 voc	Config 2, 5	15	-98		
	Config 3, 6	kHz	-98		
N_{oc}	Config 1, 4	dBm/		-98	
¹ Voc	Config 2, 5	SCS		-98	•
	Config 3, 6			-95	•
Propagation cor	dition		TDL-0	300ns 1	100Hz
		•	•		

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Table A.4.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1			
rielu	Value			
gapOffset	0			
Note 1: E-UTRAN	PCell and PSCell are SFN-synchronous			

Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).

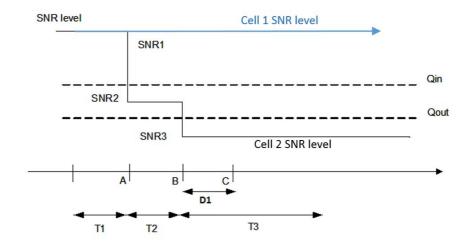


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

A.4.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.4.5.1.2.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only	te: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value		
			Test 1		
	Active E-UTRA PCell		Cell 1		
E-UTRA RF Chan	nel Number		1		
Active PSCell			Cell 2		
RF Channel Number	ber		2		
Duplex mode	Config 1, 4		FDD		
	Config 2, 3, 5,		TDD		
	6				
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52		
	Config 2, 5	_	10: N _{RB,c} = 52		
DI : W I DIMD	Config 3, 6		40: N _{RB,c} = 106		
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1		
DL dedicated	Config 1, 2, 3,				
BWP	4, 5, 6		DLBWP.1.1		
configuration	,, ,, ,				
UL initial BWP	Config 1, 2, 3,		LII DIMD o 4		
configuration	156		ULBWP.0.1		
UL dedicated	Config 1, 2, 3,				
BWP	4, 5, 6		ULBWP.1.1		
configuration					
TDD	Config 1, 4		Not Applicable		
Configuration	Config 2, 5		TDDConf.1.1		
	Config 3, 6		TDDConf.2.1		
CORESET	Config 1, 4		CR.1.1 FDD		
Reference	Config 2, 5		CR.1.1 TDD		
Channel	Config 3, 6		CR.2.1 TDD		
SSB	Config 1, 4		SSB.1 FR1		
Configuration	Config 2, 5		SSB.1 FR1		
	Config 3, 6		SSB.2 FR1		
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1		
	Config 3, 6		SMTC.1		
PDSCH/PDCCH	Config 1, 2, 4,		15 kHz		
subcarrier	5				
spacing	Config 3, 6		30 kHz		
PRACH	Config 1, 2, 4,		Table A.3.8.2.1-1		
Configuration	5		Table A.3.8.2.1-1		
	Config 3, 6				
SSB index assign			0		
OCNG parameter	S		OP.1		
CP length			Normal		
Correlation Matrix	and Antenna		2x2 Low		
Configuration	Configuration				

	DOL (1.0			
In sync	DCI format		1-0			
transmission	Number of		2			
parameters	Control OFDM					
	symbols	005	4			
	Aggregation level	CCE	<u>4</u> 0			
	Ratio of	dB	U			
	hypothetical PDCCH RE					
	energy to average					
	SSS RE energy					
	Ratio of	dB	0			
	hypothetical PDCCH DMRS					
	energy to average					
	SSS RE energy					
	DMRS precoder		REG bundle size			
	granularity					
	REG bundle size		6			
Out of sync	DCI format		1-0			
transmission	Number of		2			
parameters	Control OFDM					
	symbols					
	Aggregation level	CCE	8			
	Ratio of	dB	4			
	hypothetical PDCCH RE					
	energy to average					
	SSS RE energy					
	Ratio of	dB	4			
	hypothetical					
	PDCCH DMRS					
	energy to average					
	SSS RE energy		DE0.1 " '			
	DMRS precoder		REG bundle size			
	granularity					
DRX	REG bundle size		6 OFF			
			 N.A.			
Gap pattern ID Layer 3 filtering			N.A. Enabled			
Layer 3 milering	J		Lilabieu			
T310 timer		ms	1000			
T311 timer		ms ms	1000 1000			
T311 timer N310			1000 1			
T311 timer N310 N311			1000 1 1			
T311 timer N310 N311 CSI-RS for	Config 1, 4		1000 1 1 CSI-RS.1.1 FDD			
T311 timer N310 N311	Config 2, 5		1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD			
T311 timer N310 N311 CSI-RS for CSI reporting	Config 2, 5 Config 3, 6		1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for	Config 2, 5 Config 3, 6 Config 1, 4		1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD			
T311 timer N310 N311 CSI-RS for CSI reporting	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5		1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking	Config 2, 5 Config 3, 6 Config 1, 4	ms	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	ms	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0.2			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking T1 T2	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	ms s s	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0.2 0.2			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking T1 T2 T3	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	ms S S S	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0.2 0.2 0.24			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking T1 T2 T3 T4	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	ms s s s	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0.2 0.2 0.24 0.2			
T311 timer N310 N311 CSI-RS for CSI reporting CSI-RS for tracking T1 T2 T3	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	ms S S S	1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0.2 0.2 0.24			

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio o	f PDCCH DMRS to SSS	dB			4		
EPRE ratio of PDCCH to PDCCH DMRS		dB			0		
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB			0		
EPRE ratio o	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio o	EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
SNR on other channels and signals	Config 1, 2, 3, 4, 5, 6	dB	1				
	Config 1, 4	dBm/	-98				
N_{oc}	Config 2, 5	15			-98		
	Config 3, 6	kHz			-98		
N	Config 1, 4	dBm/	-98				
N_{oc}	Config 2, 5	SCS			-98		
	Config 3, 6		-95				
Propagation	Propagation condition TDL-C 300ns 100Hz						
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated							
and a constant total transmitted power spectral density is achieved for all							

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

SNR level SNR1 SNR5 Qin SNR2 SNR3 Cell 2 SNR level A B C D E F D1

Table A.4.5.1.2.1-4: Void

Figure A.4.5.1.2.1-1: SNR variation for in-sync testing

T4

T5

T3

A.4.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

T2

A.4.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.3.1-1. The test parameters are given in Tables A.4.5.1.3.1-2 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-

duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.1.3.1-1: Supported test configurations for FR1 PSCell

Configuration	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is o	Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Numb			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier	Config 3, 6		30 kHz
spacing			
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
	SSB index assigned as RLM RS		0
OCNG parameters			OP.1
CP length			Normal

Correlation Matrix	and Antenna		2x2 Low	
Configuration				
Out of sync	DCI format		1-0	
transmission	Number of Control		2	
parameters	OFDM symbols			
	Aggregation level	CCE	8	
	Ratio of	dB	4	
	hypothetical			
	PDCCH RE			
	energy to average			
	SSS RE energy			
	Ratio of	dB	4	
	hypothetical			
	PDCCH DMRS			
	energy to average			
	SSS RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX Configuration	n		DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD	
reporting	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
tracking	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
T1			0.2	
T2		S	0.68	
T3		S	0.68	
D1		S	0.64	
Note 1: All con	figurations are assign	ad to the	LIE prior to the start of time period	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

	Parameter	Unit		Test 1		
			T1	T2	T3	
EPRE ratio	of PDCCH DMRS to SSS	dB		4		
EPRE ratio	of PDCCH to PDCCH DMRS	dB		0		
EPRE ratio	of PBCH DMRS to SSS	dB				
EPRE ratio	of PBCH to PBCH DMRS	dB				
EPRE ratio	of PSS to SSS	dB		0		
EPRE ratio	of PDSCH DMRS to SSS	dB				
EPRE ratio	of PDSCH to PDSCH DMRS	dB				
EPRE ratio	of OCNG DMRS to SSS	dB				
EPRE ratio	of OCNG to OCNG DMRS	dB				
SNR on	Config 1, 4	dB	1	-7	-15	
RLM-RS	Config 2, 5		1	-7	-15	
	Config 3, 6	1	1	-7	-15	

SNR on other channels and signals	Config 1, 2, 3, 4, 5, 6	dB	1			
N_{oc}	Config 1, 4	dBm/15k	-98			
1 voc	Config 2, 5	Hz	-98			
	Config 3, 6		-98			
N_{oc}	Config 1, 4	dBm/SCS	-98			
¹ V _{oc}	Config 2, 5		-98			
	Config 3, 6		-95			
Propagatio	n condition		TDL-C 300ns 100Hz			
Note 1:	Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total					
1	transmitted power spectral density is achieved for all OFDM symbols.					
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.						

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in

Figure A.4.5.1.3.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 5: testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.4.5.1.3.1-4: Void

Table A.4.5.1.3.1-5: Void

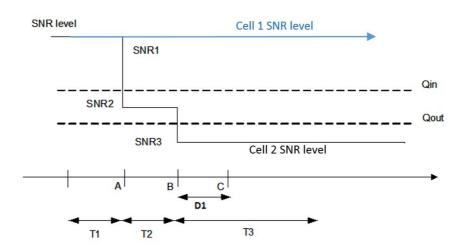


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

A.4.5.1.3.2 **Test Requirements**

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
			- · · ·
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Nu	mber		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: $N_{RB,c} = 52$
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3,		DLBWP.0.1
configuration	4, 5, 6		DEBVVF .O. I
DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1
configuration	4, 5, 6		DEDVVF.1.1
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1
configuration	4, 5, 6		OLDVVF.U.1

UL dedicated BWF	Config	1 2 2		
configuration	4, 5, 6	1, 2, 3,		ULBWP.1.1
TDD Configuration	Config	1 /		Not Applicable
Configuration	Config			TDDConf.1.1
				TDDConf.2.1
CORESET Refere		Config 3, 6 Config 1, 4		CR.1.1 FDD
Channel	Config			CR.1.1 TDD
Charine	Config			CR.2.1 TDD
CCD Configuration				
SSB Configuration	Config			SSB.1 FR1
	Config :			SSB.1 FR1
CMTC Configuration	Config	3, 6		SSB.2 FR1
SMTC Configuration		1, 2, 4, 5		SMTC.1
	Config :	3, 6		SMTC.1
PDSCH/PDCCH	Config	1, 2, 4, 5		15 kHz
subcarrier spacing	Config	3, 6		30 kHz
PRACH Configurat	ion Config	1, 2, 4, 5		Table A.3.8.2.1-1
	Config	3, 6		Table A.3.8.2.1-1
SSB index assigne	d as RLM RS			0
OCNG parameters				OP.1
CP length				Normal
Correlation Matrix	and Antenna			2x2 Low
Configuration	,			
In sync	DCI format			1-0
transmission	Number of Co	ontrol		2
parameters	OFDM symbo			
ļ '	Aggregation		CCE	4
	Ratio of hypo		dB	0
		CCH RE energy to		-
	average SSS			
	energy			
	Ratio of hypo	thetical	dB	0
	PDCCH DMF			
	energy to ave	rgy to average		
	SSS RE ener			
	DMRS preco			REG bundle size
	granularity			. (20 24.14.6 5.25
	REG bundle	size		6
Out of sync	DCI format			1-0
transmission	Number of Co	ontrol		2
parameters	OFDM symbo			_
	Aggregation		CCE	8
	Ratio of hypo		dB	4
	PDCCH RE		u.D	•
	average SSS			
	energy			
	Ratio of hypo	thetical	dB	4
	PDCCH DMF			
	energy to ave			
	SSS RE ener			
	DMRS preco			REG bundle size
	granularity			
REG bundle size		size		6
DRX Configuration				DRX.3
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer		ms	1000	
T311 timer			ms	1000
N310				1
N310				•

N311			1
	I = -: -		
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.64
T4		S	0.2
T5		S	0.88
D1		S	0.84

All configurations are assigned to the UE prior to the start of time period Note 1:

T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

E-UTRAN is in non-DRX mode under test. Note 3:

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of	PDCCH DMRS to SSS	dB		•	4		
EPRE ratio of	PDCCH to PDCCH DMRS	dB			0		
EPRE ratio of	PBCH DMRS to SSS	dB					
EPRE ratio of	PBCH to PBCH DMRS	dB					
EPRE ratio of	PSS to SSS	dB			0		
EPRE ratio of	PDSCH DMRS to SSS	dB					
EPRE ratio of	PDSCH to PDSCH DMRS	dB					
EPRE ratio of	OCNG DMRS to SSS	dB					
EPRE ratio of	OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
SNR on other channels and signals Config 1, 2, 3, 4, 5, 6 dB		dB	1				
N	Config 1, 4	dBm/15	-98				
N_{oc} Config 1, 4 Config 2, 5		kHz	-98				
Config 3, 6					-98		
N_{oc}	Config 1, 4	dBm/SCS			-98	•	
Config 2, 5					-98		
Config 3, 6			-95				
Propagation c	ondition		TDL-C 300ns 100Hz				

OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total Note 1: transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and Note 4: SNR5 respectively in Figure A.4.5.1.4.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 5: testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.4.5.1.4.1-4: Void

Table A.4.5.1.4.1-5: Void

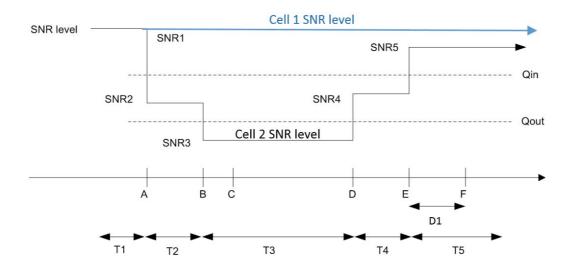


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.5.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
•	Config 2, 3, 5, 6	1	TDD
TDD Configuration	Config 1, 4		Not Applicable
_	Config 2, 5	1	TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna C	onfiguration		2x2 Low
	DCI format		1-0

	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
Out of sync transmission	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
parameters	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44
	H is not transmitted after T1 start n-DRX mode under test.	S.	

Table A.4.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Pai	ameter	Unit		Test 1		
			T1	T2	T3	
PDCCH_bet	а	dB	4			
PDCCH_DM	IRS_beta	dB		4		
PBCH_beta		dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_bet	а	dB				
OCNG_beta		dB				
SNR on	Config 1, 4	dB	1	-7	-15	
RLM-RS	Config 2, 5		1	-7	-15	
	Config 3, 6		1	-7	-15	
SNR on	Config 1, 4	dB		1		
other	Config 2, 5		1			
channels	Config 3, 6		1			
and signals						
N_{oc}	Config 1, 4	dBm/15K	-98			
Config 2, 5		Hz	-98			
	Config 3, 6			-98		

Propagat	Propagation condition		TDL-C 300ns 100Hz	
Note 1:		OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.		
Note 2:	The uplink resource period T1.	s for CSI rep	porting are assigned to the UE prior to the start of time	
Note 3:	NZP CSI-RS resour the start of time peri		guration for CSI reporting are assigned to the UE prior to	
Note 4:	Measurement gap of	onfiguration	is assigned to the UE prior to the start of time period T1.	
Note 5:	The timers and laye period T1.	r 3 filtering r	elated parameters are configured prior to the start of time	
Note 6:	The signal contains	PDCCH for	UEs other than the device under test as part of OCNG.	
Note 7:	SNR levels correspond	ond to the sig	gnal to noise ratio over the SSS REs.	
Note 8:	The SNR in time pe respectively in figure	,	and T3 is denoted as SNR1, SNR2 and SNR3 -1.	
Note 9:		•	or testing a UE which supports 2RX on at least one band. rts 4RX on all bands, the SNR during T3 is [A.3.6].	

Table A.4.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field		Test 1
	rieid	
	gapOffset	0
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo	
	aligned.	

Table A.4.5.1.5.1-4: Void

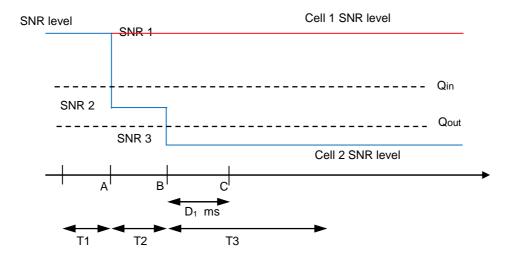


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.6.1-1, A.4.5.1.6.1-2, and A.4.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.6.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

Param	eter	Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode Config 1, 4			FDD	
	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4	Not Applicable		
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	

DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configura	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configura	Config 1, 2, 3, 4, 5,		ULBWP.1.1
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
COD Comigaration	Config 2, 5	1	SSB.1 FR1
	Config 3, 6	1	SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
Sivi 1 & Corniguration	Config 3, 6	-	SMTC.1
PDSCH/PDCCH subcarrier s			15 KHz
		-	
TDC configuration	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCF	I/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Anten	na Configuration		2x2 Low
	DCI format		1-0
	Number of Control OFDM		2
Out of sync transmission	symbols		_
parameters	Aggregation level	CCE	8
parametere	Ratio of hypothetical	dB	4
	PDCCH RE energy to	ub	
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to	ub	4
	average CSI-RS RE		
	•		
	energy DMRS precoder granularity		DEC hundle size
			REG bundle size
	REG bundle size		6
	DCI format		1-0
La como facilidade a	Number of Control OFDM		2
In sync transmission	symbols		
parameters	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE		
	energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
1010 00101		1110	1000

T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for reporting Config 1, 4			CSI-RS.1.1 FDD	
	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
T1		S	0.2	
T2		S	0.2	
T3		S	0.44	
T4		S	0.2	
T5		S	0.88	
T6		S	0.84	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
PDCCH_beta		dB	4				
PDCCH_DMRS	S_beta	dB	4				
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB			0		
PDSCH_beta							
OCNG_beta		dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
SNR on other	Config 1, 4	dB			1		
channels and	Config 2, 5		1				
signals	Config 3, 6				1		
N_{oc}	Config 1, 4	dBm/15KHz			-98		
1 oc	Config 2, 5				-98		
	Config 3, 6			•	-98		
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1

Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.6.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

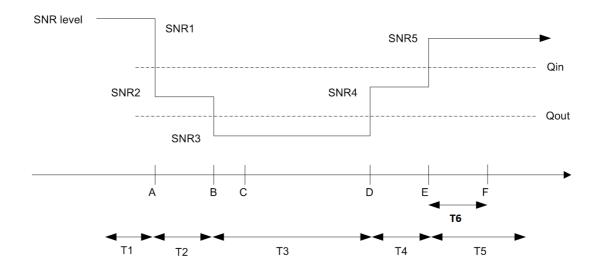


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.7.1-1, A.4.5.1.7.1-2, and A.4.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.7.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4	_	Not Applicable	
	Config 2, 5	_	TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD	
Channel	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	
	Config 2, 5	_	SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6		SMTC.1	
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz	
spacing	Config 3, 6		30 KHz	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
	Config 1, 4		Resource #4 in TRS.1.1 FDD	
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD	
	Config 3, 6		Resource #4 in TRS.1.2 TDD	
TCI configuration for PDCCH/P	DSCH		TCI.State.0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
	DCI format		1-0	

	Number of Control OFDM		2	
	symbols			
	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	4	
	PDCCH RE energy to			
	average CSI-RS RE			
Out of sync transmission	energy			
parameters	Ratio of hypothetical	dB	4	
	PDCCH DMRS energy to			
	average CSI-RS RE			
	energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD	
	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
T1		s	0.2	
T2		s	1.28	
T3		s	1.28	
D1		s	1.24	
Note 1: UE-specific PDCC	H is not transmitted after T1 starts	s		

Note 1: UE-specific PDCCH is not transmitted after Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit		Test 1		
			T1	T2	T3	
PDCCH_beta		dB	4			
PDCCH_DMRS_beta		dB	4			
PBCH_beta		dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_bet	ta	dB				
OCNG_beta	1	dB				
SNR	Config 1, 4	dB	1	-7	-15	
	Config 2, 5		1	-7	-15	
	Config 3, 6		1	-7	-15	
SNR on	Config 1, 4	dB	1			
other	Config 2, 5			1		
channels	Config 3, 6			1		
and signals						
N_{oc}	Config 1, 4	dBm/15KHz		-98		
'oc	Config 2, 5			-98		
Config 3, 6				-98		
Propagation condition			TDL-C 300ns 100Hz			
				2 are fully allocated or all OFDM symbo		

- The uplink resources for CSI reporting are assigned to the UE prior to the start of time Note 2: period T1.
- NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to Note 3: the start of time period T1.
- Measurement gap configuration is assigned to the UE prior to the start of time period Note 4: T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 6:
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 Note 8: respectively in figure A.4.5.1.7.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one Note 9: band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.7.1-3A: Void

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

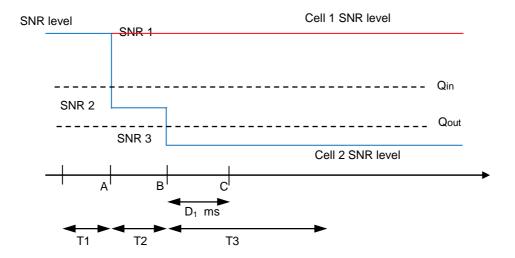


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

Parame	ter	Unit	Value	
			Test 1	
A .:			0 "4	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number	10 % 4 4		2	
Duplex mode	Config 1, 4	-	FDD	
TDD O C C	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD	
Channel	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6		SMTC.1	
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz	
spacing	Config 3, 6		30 KHz	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
	Config 1, 4		Resource #4 in TRS.1.1 FDD	
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD	
	Config 3, 6		Resource #4 in TRS.1.2 TDD	
TCI configuration for PDCCH/P	DSCH		TCI.State.0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna	Configuration		2x2 Low	

Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310		·	1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
. 3	Config 2, 5	F	CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
T4		s	0.2
T5		s	1.88
T6		S	1.84
	CH is not transmitted after T1 sta on-DRX mode under test.	arts.	

Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5

PDCCH_beta		dB	4					
PDCCH_DMRS	S_beta	dB		4				
PBCH_beta		dB						
PSS_beta		dB						
SSS_beta		dB			0			
PDSCH_beta		dB						
OCNG_beta		dB						
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1	
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1	
	Config 3, 6		1	-7	-15	-4.5	1	
SNR on other	Config 1, 4	dB	1					
channels and	Config 2, 5		1					
signals	Config 3, 6		1					
N_{oc}	Config 1, 4	dBm/15KHz	-98					
000	Config 2, 5		-98					
	Config 3, 6		-98					
Propagation co	ndition		TDL-C 300ns 100Hz					

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

	Field	Test 1	
	rieia		
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned.		

Table A.4.5.1.8.1-4: Void

Table A.4.5.1.8.1-5: Void

Table A.4.5.1.8.1-6: Void

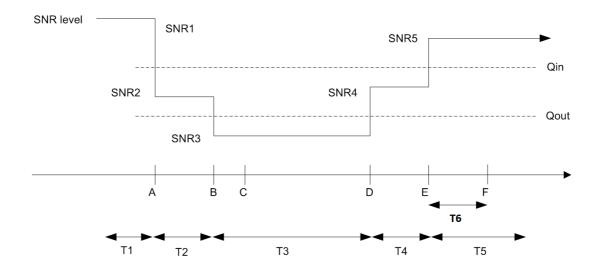


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2 Interruption

A.4.5.2.1 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.1.1-2 and A.4.5.2.1.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.1.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. CORESET indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.1.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		4.0	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.4	DRX related parameters are defined in
		DRA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Paramet	ter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6	1	TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5	1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial BWP	Config 1,4		DLBWP.0
Configuration	Config 2,5		DLBWP.0
	Config 3,6		DLBWP.0
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
	Config 3,6]	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD

	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and A	Antenna		1x2 Low
Configuration			
EPRE ratio of PSS to S	SS		
EPRE ratio of PBCH DN	MRS to SSS		
EPRE ratio of PBCH to	PBCH DMRS		
EPRE ratio of PDCCH [DMRS to SSS		
EPRE ratio of PDCCH t	o PDCCH DMRS		
EPRE ratio of PDSCH [DMRS to SSS	dB	0
EPRE ratio of PDSCH t	o PDSCH	1	
EPRE ratio of OCNG D	MRS to SSS(Note		
1)			
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1)			
Noc ^{Note 2}		dBm/15	-104
		kHz	-104
SS-RSRP Note 3		dBm/15	-87
		kHz	
Ê _s /I _{ot}		dB	17
Ês/Noc		dB	17
Io ^{Note3}	Config 1,2,4,5	dBm/	-58.96
	Oomig 1,2,4,0	9.36MHz	00.00
Config 3,6		dBm/	-52.86
		38.16MHz	32.00
Time offset to Cell1 Note 4		μs	33
Propagation Condition	Propagation Condition		AWGN
			allocated and a constant total transmitted power
· ·	sity is achieved for a		
Nata O. Latambarra	Constant of the constant of the constant		the analytical to the first terminate of the beautiful and a con-

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Table A.4.5.2.1.1-4: Void

A.4.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.1.2-1.

Table A.4.5.2.1.2-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption length X
<i>p</i> .	length (ms)	Sync
0	1	1
1	0.5	1

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.2 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.2.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		., _	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.6	DRX related parameters are defined in
		DRA.0	Table A.3.3.6-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell2	
Frequency Range			FR1	
Duplex mode	Config 1,4		FDD	
	Config 2,3,5,6		TDD	
TDD configuration	Config 1,4		Not Applicable	
	Config 2,5		TDDConf.1.1	
	Config 3,6		TDDConf.2.1	
BWchannel	Config 1,4		10: N _{RB,c} = 52	
	Config 2,5		10: N _{RB,c} = 52	
	Config 3,6		40: N _{RB,c} = 106	
Initial BWP	Config 1,4		DLBWP.0	
Configuration	Config 2,5		DLBWP.0	
	Config 3,6		DLBWP.0	
PDSCH Reference	Config 1,4		SR.1.1 FDD	
measurement channel	Config 2,5		SR.1.1 TDD	
	Config 3,6		SR.2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	
parameters	Config 2,5		CR.1.1 TDD	
	Config 3,6		CR.2.1 TDD	
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	
parameters	Config 2,5		CCR.1.1 TDD	
	Config 3,6		CCR.2.1 TDD	
OCNG Patterns			OP.1	
SMTC Configuration			SMTC.1	
TRS configuration	Config 1,4		TRS.1.1 FDD	
	Config 2,5		TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	
	Config 3,6		SSB.2 FR1	

Correlation Matrix and Antenna			1x2 Low	
Configuration				
EPRE ratio	o of PSS to SSS			
EPRE ratio	o of PBCH DMRS to SSS			
EPRE ratio	o of PBCH to PBCH DMRS			
EPRE ratio	o of PDCCH DMRS to SSS			
EPRE ratio	of PDCCH to PDCCH DMRS			
EPRE ratio	o of PDSCH DMRS to SSS	dB	0	
EPRE ratio	o of PDSCH to PDSCH			
EPRE ratio	o of OCNG DMRS to SSS(Note			
1)				
EPRE ratio	o of OCNG to OCNG DMRS			
(Note 1)				
Noc ^{Note 2}	Noc ^{Note 2}		-104	
		kHz	-104	
SS-RSRP	Note 3	dBm/15	-87	
		kHz	-01	
Ê _s /I _{ot}		dB	17	
Ês/Noc		dB	17	
Io ^{Note3}	Io ^{Note3} Config 1,2,4,5		-58.96	
Config 3,6		dBm/ 38.16MHz	-52.86	
Time offset to Cell1 Note 4		μs	500	
Propagation Condition			AWGN	
Note 1:	OCNG shall be used such that b	ooth cells are full	y allocated and a constant total transmitted power	
	spectral density is achieved for	all OFDM symbo	ols.	
Note 2:	Interference from other cells and	d noise sources i	not specified in the test is assumed to be constant over	
	subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled.			

- subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and Note 4: slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Table A.4.5.2.2.1-4: Void

A.4.5.2.2.2 **Test Requirements**

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.2.2-1.

Table A.4.5.2.2.2-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption length X	
μ.	length (ms)	Async	

0	1	2
1	0.5	2

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.3 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.4.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.3.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2 and A.4.5.2.3.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.3.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is on	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.3.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OH	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6		TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5	1	TDDConf.1.1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 2,5	1	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 3,6	1	40: N _{RB,c} = 106	40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5	1	DLBWP.0.1	DLBWP.0.1
	Config 3,6		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5	1	DLBWP.1.1	DLBWP.1.1
	Config 3,6	1	DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5	1	ULBWP.0.1	ULBWP.0.1
	Config 3,6		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1	ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1	ULBWP.1.1
	Config 3,6		ULBWP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5	1	SR.1.1 TDD	-
	Config 3,6	1	SR.2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD	CR.1.1 TDD
	Config 3,6]	CR.2.1 TDD	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5]	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD

TRS configuration	Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2,5	1	TRS.1.1 TDD	TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
TCI state			TCI.State.0	TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
	Config 3,6		SSB.2 FR1	SSB.2 FR1
Correlation Matrix and Ar	ntenna		1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SS	S			
EPRE ratio of PBCH DMI	RS to SSS			
EPRE ratio of PBCH to P	BCH DMRS			
EPRE ratio of PDCCH DI	MRS to SSS			
EPRE ratio of PDCCH to	PDCCH DMRS			0
EPRE ratio of PDSCH DN	MRS to SSS	dB	0	
EPRE ratio of PDSCH to	PDSCH			
EPRE ratio of OCNG DM	RS to SSS(Note			
1)				
EPRE ratio of OCNG to C	OCNG DMRS			
(Note 1)				
Noc ^{Note 2}		dBm/15	-104	-104
		kHz	101	
SS-RSRP Note 3		dBm/15	-87	-87
A .		kHz	-	
Ê _s /I _{ot}		dB	17	17
Ê _s /N _{oc}		dB	17	17
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	-58.96	-58.96
	33111g 1,2,1,3		30.30	
Config 3,6		dBm/	-52.86	-52.86
		38.16MHz		
Time offset to Cell1 Note 4		μs	33	33
Time offset to Cell2 Note 5		μs	-	3
Propagation Condition			AWGN	AWGN
Note 1: OCNG shall be	a used such that he	th calle are fully	allocated and a constant	total transmitted navyar

- spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

A.4.5.2.3.2 **Test Requirements**

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-1 if the NR PSCell is not in the same band as the deactivated SCell or Table A.4.5.2.3.2-2 if the NR PSCell is in the same band as the deactivated SCell.

Table A.4.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1ms + SMTC duration subframes for intraband EN-DC, 1 subframe for synchronous interband EN-DC.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.4.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2 and A.4.5.2.4.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.4.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is on	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	s	10	

Table A.4.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6		TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5		TDDConf.1.1	TDDConf.1.1
	Config 3,6		TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
Initial BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1	DLBWP.0.1
	Config 3,6		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1	DLBWP.1.1
	Config 3,6		DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1	ULBWP.0.1

	Config 3,6		ULBWP.0.1	ULBWP.0.1	
Dedicated UL BWP Config 1,4			ULBWP.1.1	ULBWP.1.1	
Configuration Config 2,5		1	ULBWP.1.1	ULBWP.1.1	
Config 3,6		1	ULBWP.1.1	ULBWP.1.1	
PDSCH Reference	Config 1,4		SR.1.1 FDD	-	
measurement channel	Config 2,5	1	SR.1.1 TDD	-	
	Config 3,6	1	SR.2.1 TDD	-	
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD	
parameters	Config 2,5	1	CR.1.1 TDD	CR.1.1 TDD	
	Config 3,6		CR.2.1 TDD	CR.2.1 TDD	
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD	
parameters	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD	
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD	
TRS configuration	Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD	
	Config 2,5	1	TRS.1.1 TDD	TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	TRS.1.2 TDD	
OCNG Patterns			OP.1	OP.1	
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1	
	Config 3,6		SSB.2 FR1	SSB.2 FR1	
SMTC Configuration			SMTC.1	SMTC.1	
TCI state			TCI.State.0	TCI.State.0	
Correlation Matrix and A	ntenna		1x2 Low	1x2 Low	
Configuration					
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH D					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH D		dB	0	0	
EPRE ratio of PDSCH to					
EPRE ratio of OCNG DN	IRS to SSS(Note				
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)		JD /4.5			
NocNote 2		dBm/15	-104	-104	
SS-RSRP Note 3		kHz dBm/15			
OO-NORF		dBm/15 kHz	-87	-87	
Ê _s /I _{ot}		dB	17	17	
Ês/Noc		dB	17	17	
Ls/Noc Io ^{Note3}		dBm/	17	17	
10	Config 1,2,4,5	9.36MHz	-58.96	-58.96	
	Config 3,6	dBm/	-52.86	-52.86	
Coming 0,0		38.16MHz		52.00	

Time offset to Cell1 Note 4		ms	3	3	
Time offs	Time offset to Cell2 Note 5		-	3	
Propagat	Propagation Condition		AWGN	AWGN	
Note 1:	Note 1: OCNG shall be used such that bot		y allocated and a constant to	tal transmitted power	
	spectral density is achieved for all	OFDM symbo	ls.		
Note 2:	Interference from other cells and r	pise sources not specified in the test is assumed to be constant over			
	subcarriers and time and shall be		modeled as AWGN of appropriate power for N₀c to be fulfilled.		
Note 3: SS-RSRP and lo levels have been		derived from other parameters for information purposes. They are			
not settable parameters themselvess.					
Note 4:	Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell a			ry of E-UTRA PCell and	
slot timing boundary of PSCell at the UE ante			a connector including time ali	ignment error between the	
	two cells				
Note 5: Receive time difference between s		slot boundaries of signals received from the two cells at the UE			
antenna connector including time alignment error between the two cells.					

A.4.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length	
0	1	1	
1	0.5	1	

Table A.4.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1ms + SMTC duration subframes for synchronous intraband EN-DC, or 2 subframes for asynchronous interband EN-DC.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.5.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.5.1-2 and A.4.5.2.5.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRAN SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.5.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description	
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	lote: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.5.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		Oll	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	040	
T1	S	10	

Table A.4.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parame	ter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
-	Config 2,5	1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BW _{channel}	Config 1,4	MHz	10: N _{RB,c} = 52
	Config 2,5	1	10: N _{RB,c} = 52
	Config 3,6	1	40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5	1	DLBWP.0.1
-	Config 3,6	1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5	1	DLBWP.1.1
-	Config 3,6	1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5	1	ULBWP.0.1
	Config 3,6	1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5	1	ULBWP.1.1
	Config 3,6	1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	1	SR.1.1 TDD
	Config 3,6	1	SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
	Config 3,6	1	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5	1	CCR.1.1 TDD
	Config 3,6	1	CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
•	Config 2,5	1	TRS.1.1 TDD
	Config 3,6	1	TRS.1.2 TDD
OCNG Patterns	<u>, </u>		OP.1
SMTC Configuration			SMTC.1
TCI state	-		TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
Ŭ	Config 3,6	†	SSB.2 FR1
L	<u> </u>	I	

Correlation Matrix a	ind Antenna		1x2 Low	
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCI	H DMRS to SSS			
EPRE ratio of PBC	H to PBCH DMRS	1		
EPRE ratio of PDC	CH DMRS to SSS			
EPRE ratio of PDC	CH to PDCCH DMRS	7		
EPRE ratio of PDS0	CH DMRS to SSS	dB	0	
EPRE ratio of PDS0	CH to PDSCH			
EPRE ratio of OCN	G DMRS to SSS(Note			
1)				
EPRE ratio of OCN	EPRE ratio of OCNG to OCNG DMRS (Note 1)			
N _{oc} Note 2		dBm/15	-104	
		kHz	-104	
SS-RSRP Note 3		dBm/15	-87	
		kHz	-01	
Ê _s /I _{ot}		dB	17	
Ês/N _{oc}		dB	17	
Io ^{Note3}	Config 1,2,4,5	dBm/	-58.96	
	Oomig 1,2,4,0	9.36MHz	30.30	
	Config 3,6		-52.86	
		38.16MHz	02.00	
Time offset to Cell1 Note 4		μs	33	
Propagation Condition			AWGN	
		•	llocated and a constant total transmitted power	
•	density is achieved for a	•		
Note 2. Interference from other cells and noise accurace not appelled in the test is accurated to be constant over				

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

A.4.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed X defined in Table A.4.5.2.5.2-1 if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell or Y in Table A.4.5.2.3.2-1 if the NR PSCell is in the same band as the E-UTRAN deactivated SCell.

Table A.4.5.2.5.2-1: Interruption length X and Y at measurements on deactivated E-UTRA SCC

и	NR Slot	Interruption length X slot	Interruption length Y slot
μ.	length (ms)	Sync	
0	1	1	1
1	0.5	1	1

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.6.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.6.1-1 and A.4.5.2.6.1-2 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.6.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only	ote: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.6.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1.0	One is E-UTRAN RF channel and two is
		1, 2	NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		Oll	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parame	eter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1

Correlation Matrix	and Antenna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS			
EPRE ratio of PB0	CH DMRS to SSS		
EPRE ratio of PB0	CH to PBCH DMRS		
EPRE ratio of PD0	CCH DMRS to SSS		
EPRE ratio of PD0	CCH to PDCCH DMRS		
EPRE ratio of PDS	SCH DMRS to SSS	dB	0
EPRE ratio of PDS	SCH to PDSCH		
EPRE ratio of OC	NG DMRS to SSS(Note		
1)			
EPRE ratio of OC	EPRE ratio of OCNG to OCNG DMRS		
(Note 1)			
N _{oc} Note 2		dBm/15	-104
		kHz	-104
SS-RSRP Note 3		dBm/15	-87
		kHz	-01
Ê _s /I _{ot}		dB	17
Ês/N _{oc}		dB	17
Io ^{Note3}	Config 1,2,4,5	dBm/	-58.96
	00mg 1,2,1,0	9.36MHz dBm/	00.00
	Config 3,6		-52.86
		38.16MHz	
Time offset to Cell1 Note 4		μs	500
Propagation Condition			AWGN
		-	allocated and a constant total transmitted power
•	I density is achieved for a	•	
Note 2: Interfer	ence from other cells and	noise sources n	ot specified in the test is assumed to be constant over

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

A.4.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.6.2-2: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.7 Void

A.4.5.3 SCell Activation and Deactivation Delay

A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.4.5.3.1.1-1 below. The test parameters are given in Tables A.4.5.3.1.1-2 and cell-specific parameters in A.4.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in clause 8.3. The UE shall start reporting CSI in PSCell in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell or PSCell interruption due to activation of SCell shall occur in the slot $(m+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}])$, as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3, and any PCell and PSCell interruption due to the deactivation shall occur in the slot $(n+1+[T_{HARQ}])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for SCell is discontinued.

Table A.4.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.4.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.1
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
Т3	s	1	During this time the UE shall deactivate the SCell.
THARQ	slot	k	k is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by dl-DataToUL-ACK if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]

T _{CSI_Reporting}	ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]
k	ms	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe, } \mu} + 1$	As specified in clause 4.3 of TS 38.213 [3]

Table A. 4.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	-,	Cell 2	Cell 3	
COD ADEON					T1 T2 T3	
SSB ARFCN	Config 1 4		freq1 freq2 FDD		·	
Duplex mode	Config 1,4 Config 2,3,5,6		TDD			
	1			Not Applicable		
" · · ·	Config 1,4			-	•	
TDD configuration	Config 2,5				Conf.1.1	
	Config 3,6			TDDC	Conf.2.1	
	Config 1,4			10: N _F	RB,c = 52	
BW _{channel}	Config 2,5	MHz		10: N _F	RB,c = 52	
	Config 3,6			40: N _{RI}	в,с = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6			DLBV	WP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6			DLBV	WP.1.1	
UL initial BWP	Config 1, 2, 3, 4,		ULBWP.0.1			
configuration	5, 6		OLDVVI .O.1			
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1			
DRx Cycle	0,0	ms		Not Ap	pplicable	
	Config 1,4		S	R.1.1 FDD	SR.1.1 FDD	
PDSCH Reference	Config 2,5			R.1.1 TDD	SR.1.1 TDD	
measurement channel	Config 3,6		S	R.2.1 TDD	SR.2.1 TDD	
DMOLOODEOET	Config 1,4		С	R.1.1 FDD	CR.1.1 FDD	
RMSI CORESET	Config 2,5		С	R.1.1 TDD	CR.1.1 TDD	
Reference Channel	Config 3,6		С	R.2.1 TDD	CR.2.1 TDD	
D110 00DE0EE	Config 1,4		CC	CR.1.1 FDD	CCR.1.1 FDD	
RMC CORESET	Config 2,5		CC	CR.1.1 TDD	CCR.1.1 TDD	
Reference Channel	Config 3,6		CC	CR.2.1 TDD	CCR.2.1 TDD	
	Config 1,4			S.1.1 FDD	TRS.1.1 FDD	
TRS configuration	Config 2,5			S.1.1 TDD	TRS.1.1 TDD	
J	Config 3,6			S.1.2 TDD	TRS.1.2 TDD	
OCNG Patterns	J ,				P.1	
SMTC configuration			SMTC.1			
Config 1 2 4 5					.1 FR1	
SSB configuration	Config 3,6		SSB.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5				kHz	
subcarrier spacing	Config 3,6	kHz			kHz	
EPRE ratio of PSS to SSS	. 5 ,-					
EPRE ratio of PBCH DMRS	S to SSS	٩D			0	
EPRE ratio of PBCH to PBC		dB	0		U	
EPRE ratio of PDCCH DMF	RS to SSS					

EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PD	DSCH		
EPRE ratio of OCNG DMRS	S to SSS(Note 1)		
EPRE ratio of OCNG to OC	NG DMRS (Note 1)		
$N_{oc}^{ m Note2}$		dBm/15kHz	-104
λ/ Note2	Config 1,2,4,5		-104
N_{oc}^{Note2}	Config 3,6	dBm/SCS	-101
\hat{E}_{s}/I_{ot}		dB	17
\hat{E}_s/N_{oc}		dB	17
CC DCDDNote3	Config 1,2,4,5	4D/CCC	-87
SS-RSRP ^{Note3} Config 3,6		dBm/SCS	-84
SCH_RP Note 3		dBm/15 kHz	-87
Propagation condition		-	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

A.4.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in slot (m+k), or in slot (m+1+[T_{HARQ} +3ms+ T_{SSB_max} + $T_{SMTC_duration}$]+1) as defined in clause 8.3 if slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, $T_{activation_time}=[T_{SMTC_SCell}+5ms]$, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $(m+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms+T_{SMTC_duration}])$, as defined in clause 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot $(n+1+[T_{HARQ}])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting}) as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.4.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 320 ms SCell measurement cycle

A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1. The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.4.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[T_{SMTC_MAX} + T_{SMTC_SCell} + 5ms]$.

A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment [100ms] after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2. The UE shall be able to report valid CSI for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$ as defined in clause 8.3 provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(m+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}])$ as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot $(n+[T_{HARQ}+3ms])$ as defined in clause 8.3, and any PCell and PSCell interruption due to the deactivation shall occur in the $(n+1+[T_{HARQ}))$ to $(n+1+[T_{HARQ}+3ms])$ as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.4.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

	Parameter	Unit	Value	Comment
T	1	ms	100	During this time the PSCell shall be known
				and the SCell configured, but not detected.

A.4.5.3.3.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [2* T_{SMTC_MAX} +2* T_{SMTC_SCell} +5ms] as defined in clause 8.3.

A.4.5.4 UE UL carrier RRC reconfiguration Delay

A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4 : Void

A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell 3). For SCell, both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PSCell and SCell are given in Table A. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE. At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth,
	mode	FDD duplex mode;
		SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex
		mode

2	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
3	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
4	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
5	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
6	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
7	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
8	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
9	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1,2,3, 4, 5, 6, 7, 8, 9	1, 2, 3	Three radio channels are used for these two tests.
Active cell		Config 1,2,3, 4, 5, 6, 7, 8, 9	Cell 1: E-UTRAN PCell Cell 2: FR1 PSCell Cell 3: FR1 SCell	E-UTRAN PCell on RF channel number 1 FR1 PSCell on RF channel number 2 FR1 SCell on RF channel number 3
CP length		Config 1,2,3, 4, 5, 6, 7, 8, 9	Normal	
DRX		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Measurement gap pattern Id		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4, 5, 6, 7, 8, 9	0	L3 filtering is not used
T1	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T2	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T3	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

Parameter	Unit	Test	Test 1	Test 2
		Configuration	T1 T2 T3	T1 T2 T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	2	2
		Conf 1, 2, 3	N/A	N/A
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1	TDD Conf.1.1
		Conf 7, 8, 9	TDD Conf.2.1	TDD Conf.2.1
		Conf 1, 2, 3	10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	MHz	Conf 4, 5, 6	10: N _{RB,c} = 52	10: N _{RB,c} = 52
		Conf 7, 8, 9	40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD	SR.1.1 FDD
measurement channel as defined		Conf 4, 5, 6	SR.1.1 TDD	SR.1.1 TDD
in A.3.1.1		Conf 7, 8, 9	SR 2.1 TDD	SR 2.1 TDD
RMSI CORESET		Conf 1, 2, 3	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 4, 5, 6	CR.1.1 TDD	CR.1.1 TDD
measurement channel as defined in A.3.1.2		Conf 7, 8, 9	CR.2.1 TDD	CR.2.1 TDD
RMC CORESET		Conf 1, 2, 3	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 4, 5, 6	CCR.1.1 TDD	CCR.1.1 TDD
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	CCR.2.1 TDD	CCR.2.1 TDD
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	OP.1	OP.1
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1	SSB.1 FR1
Ŭ		Conf 7, 8, 9	SSB.2 FR1	SSB.2 FR1
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	SMTC.1	SMTC.1
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1	ULBWP.1.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to				
SSS EPRE ratio of PBCH				
to PBCH_DMRS EPRE ratio of				
PDCCH_DMRS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0	0
EPRE ratio of PDCCH to PDCCH_DMRS		5, 5, 7, 5, 9		
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				

EPRE ratio of OCNG DMRS to SSS									
EPRE ratio of OCNG to OCNG DMRS									
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102		
$N_{_{\! oc}}$ Note 2	dBm/	Conf 1,2,3,4,5,6		-102			-102		
	SCS	Conf 7,8,9		-99			-99		
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16	
$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16	
SS-RSRP Note 3	dBm/ SCS	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86	
	303	Conf 7,8,9	-83	-83	-83	-83	-83	-83	
	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9	
Io Note 3	dBm/ 38.16 MHz	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8	
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN		
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		1 x 2			1 x 2		

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

Parameter	Unit	Test	Test 1				Test 2	
		Configuration	T1	T2	Т3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4,		3			3	
		5, 6, 7, 8, 9						
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
		Conf 3, 6, 9	TDDConf.2.1			TDDConf.2.1		
		Conf 1, 4, 7	10: N _{RB,c} = 52			10: N _{RB,c} = 52		
BW _{channel}	MHz	Conf 2, 5, 8	10: N _{RB,c} = 52			10: N _{RB,c} = 52		
		Conf 3, 6, 9	40: N _{RB,c} = 106			40: N _{RB,c} = 106		
PUSCH parameters		Conf 1, 4, 7	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A
for NR UL carrier		Conf 2, 5, 8	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A

			•				
	Conf 3, 6, 9	G-	G-FR1-	G-FR1-		G-FR1-	
		FR1-	A3-14	A3-14 in	N/A	A3-14 in	N/A
		A3-14	in [13]	[13]	,	[13]	
	Conf 1, 4, 7	in [13] Table	Table				
	Com 1, 4, 7	8.3.3.1	8.3.3.1.	Table			
		.2-1 in	2-1 in	8.3.3.1.2	N/A	N/A	N/A
		[13]	[13]	-1 in [13]			
	Conf 2, 5, 8	Table	Table				
PUCCH parameters	, , , ,	8.3.3.1	8.3.3.1.	Table	NI/A	NI/A	NI/A
For NR UL carrier		.2-1 in	2-1 in	8.3.3.1.2	N/A	N/A	N/A
		[13]	[13]	-1 in [13]			
	Conf 3, 6, 9	Table	Table	Table			
		8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
		.2-2 in	2-2 in	-2 in [13]	,, .	. 47.1	,
	0 (1 1 7	[13]	[13]	,	0.504	0.504	0.554
	Conf 1, 4, 7	NI/A	G-FR1-	NI/A	G-FR1-	G-FR1-	G-FR1-
		N/A	A3-10 in [13]	N/A	A3-10 in [13]	A3-10 in [13]	A3-10 in [13]
PUSCH parameters	Conf 2, 5, 8		G-FR1-		G-FR1-	G-FR1-	G-FR1-
for supplementary	JUIII 2, 0, 0	N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
UL		14/71	in [13]	14// ([13]	[13]	[13]
	Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
	30111 0, 0, 0	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
			in [13]		[13]	[13]	[13]
	Conf 1, 4, 7				Table	Table	Table
		N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
					-1 in [13]	-1 in [13]	-1 in [13]
PUCCH parameters	Conf 2, 5, 8				Table	Table	Table
for supplementary		N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
UL		,			-1 in [13]	-1 in	-1 in [13]
	Conf 3, 6, 9				Table	[13] Table	Table
	Coni 3, 6, 9	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
		IN/A	IN/A	IN/A	-2 in [13]	-2 in [13]	-2 in [13]
PDSCH reference	Conf 1, 4, 7		SR.1.1 FD	D		SR.1.1 FDD	2 111 [10]
measurement	Conf 2, 5, 8		SR.1.1 TD		SR.1.1 TDD		
channel as defined	Conf 3, 6, 9						
in A.3.1.1			SR 2.1 TD	D	SR 2.1 TDD		
RMSI CORESET	Conf 1, 4, 7		CR.1.1 FD		CR.1.1 FDD		
reference	Conf 2, 5, 8		CR.1.1 TD	D		CR.1.1 TDD	
measurement	Conf 3, 6, 9		op o : ==	_		an a : ====	
channel as defined			CR.2.1 TD	ט		CR.2.1 TDD	
in A.3.1.2	C		CD 4 4 FF	<u> </u>	000 () 500		
RMC CORESET reference	Conf 1, 4, 7		CCR.1.1 FE CCR.1.1 TE			CCR.1.1 FDI CCR.1.1 TDI	
measurement	Conf 2, 5, 8	(JUR.I.I IL	טע	(JUR.I.I IUI	J
channel as defined	Conf 3, 6, 9		CCR.2.1 TE	חר	_	CR.2.1 TDI	1
in A.3.1.3		•	JUIN.Z. I IL	טע		/∪ι\.∠. ι ι DI	,
OCNG Pattern Note 1	Conf 1, 2, 3		OP.1			OP.1	
	Conf 1, 2, 4, 5,			_			
SSB configuration	7,8		SSB.1 FR	1		SSB.1 FR1	
	Conf 3, 6, 9		SSB.2 FR	1		SSB.2 FR1	
SMTC configuration	Conf 1, 2, 3, 4,		SMTC.1			SMTC.1	
5, 6, 7, 8, 9			SIVITU.T			SIVITU. I	
DL initial BWP	initial BWP Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1	
configuration	5, 6, 7, 8, 9		PLDVVF.U.	1		DEDVIT .U. I	
DL dedicated BWP	Conf 1, 2, 3, 4,		DLBWP.1.	1		DLBWP.1.1	
configuration	5, 6, 7, 8, 9		J,	•			
UL dedicated BWP	Conf 1, 2, 3, 4,		ULBWP.1.	1		ULBWP.1.1	
configuration	5, 6, 7, 8, 9						

dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9			0			
dBm /	Conf 1, 2, 3, 4,		-102			-102	
15kHz		-102			-		
dBm/ SCS	7,8	-102			-102		
555			-99			-99	
dB	5, 6, 7, 8, 9	16	16	16	16	16	16
dB	5, 6, 7, 8, 9	16	16	16	16	16	16
dBm/	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
505	Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
dBm/ 38.16 MHz		-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	AWGN A			AWGN		
	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2 1 x 2					
	dBm / 15kHz dBm/ SCS dB dB dBm/ 9.36 MHz dBm/ 38.16 MHz	dBm / 15kHz	dBm / Conf 1, 2, 3, 4, 15kHz	dBm / 15kHz Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 -102 dBm/ SCS Conf 1, 2, 4, 5, 7, 8 -102 dBm/ SCS Conf 1, 2, 4, 5, 7, 8 -102 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 dBm/ SCS Conf 1, 2, 3, 4, 5, 7, 8 -86 -86 Conf 3, 6, 9 -83 -83 dBm/ SCS Conf 1, 2, 4, 5, 7, 8 -57.9 -57.9 dBm/ MHz Conf 3, 6, 9 -51.8 -51.8 dBm/ 38.16 MHz Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 AWGN Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 AWGN	dBm / 15kHz Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 -102 dBm/ SCS Conf 1, 2, 4, 5, 7, 8 -102 dBm/ SCS Conf 3, 6, 9 -99 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 16 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 16 dBm/ SCS Conf 1, 2, 3, 4, 5, 7, 8 -86 -86 -86 Conf 3, 6, 9 -83 -83 -83 dBm/ SCS Conf 1, 2, 4, 5, 7, 8 -57.9 -57.9 -57.9 dBm/ 9.36 MHz Conf 1, 2, 4, 5, 7, 8 -57.9 -57.9 -57.9 dBm/ 38.16 MHz Conf 3, 6, 9 -51.8 -51.8 -51.8 Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 AWGN Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 AWGN	dBm/ 15kHz Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 -102 dBm/ SCS Conf 1, 2, 3, 4, 7,8 -102 dBm/ SCS Conf 3, 6, 9 -99 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 16 dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 16 16 16 dBm/ SCS Conf 1, 2, 4, 5, 7,8 -86 -86 -86 -86 Conf 3, 6, 9 -83 -83 -83 -83 dBm/ SCS Conf 1, 2, 4, 5, 7,8 -57.9 -57.9 -57.9 -57.9 dBm/ 9.36 MHz Conf 3, 6, 9 -51.8 -51.8 -51.8 -51.8 dBm/ 9.38.16 MHz Conf 3, 6, 9 -51.8 -51.8 -51.8 -51.8 Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 AWGN AWGN	dBm / 15kHz

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: \hat{E}_s/I_{ot} , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.4.5.5 Beam Failure Detection and Link recovery procedures

A.4.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.4.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.1.1-1, A.4.5.5.1.1-2, A.4.5.5.1.1-3 and A.4.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.4.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.5.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value	Comment
		Test 1	
Active E-UTRA PCell		Cell 1	

E-UTRA RF Channe	Number		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
.,	Config 2, 3,	1	TDD	
	5, 6			
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5	1	TDDConf.1.1	
	Config 3, 6	1	TDDConf.1.2	
CORESET	Config 1, 4		CR. 1.1 FDD	
Reference Channel	Config 2, 5	Ī	CR. 1.1 TDD	
	Config 3, 6		CR. 2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6	1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2, 4, 5		15 KHz	
	Config 3, 6		30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.2-1	
	Config 3, 6	Ī	Table A.3.8.2.2-1	
SSB Index assigned (q ₀)	as BFD RS		0	
SSB Index assigned	as CBD RS		1	
OCNG parameters	(q ₁) OCNG parameters		OP.1	
CP length			Normal	
Correlation Matrix and Antenna			2x2 Low	
Configuration				
<u> </u>	DCI format	1	1-0	
Beam failure detection transmission	Number of Control OFDM		2	
parameters	symbols Aggregation	CCE	8	
F	level	JJL	5	

	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS energy			
	to average			
	CSI-RS RE			
	energy			
	DMRS		REG bundle size	
	precoder		TEO Buridio 8120	
	granularity			
			6	
	REG bundle		6	
DDV	size		055	
DRX			OFF	
Gap pattern ID			gp0	
rlmInSyncOutOfSyn	cThreshold		absent	When the field
				is absent, the
				UE applies the
				value 0. (Table
				8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used
Tolp Tilloonoldeeb				for Q _{out_LR_SSB}
powerControlOffsetS	39		db0	Used for
powercontrolonset	50		dbo	deriving rsrp-
				ThresholdCSI-
				RS
beamFailureInstanc	eMaxCount		n1	see TS 38.321
				[7], clause 5.17
beamFailureDetection	onTimer		pbfd4	see TS 38.321
	1			[7], clause 5.17
CSI-RS	Config 1, 4		[CSI-RS.1.1 FDD]	
configuration for				
CSI reporting				
	Config 2, 5		[CSI-RS.1.1 TDD]	
	Config 3, 6		[CSI-RS.2.1 TDD]	
CSI-RS for	Config 1, 4		[TRS.1.1 FDD]	
tracking	, , , ,			
	Config 2, 5		[TRS.1.1 TDD]	
	Config 3, 6		[TRS.1.2 TDD]	
SSB Index essiones				
SSB Index assigned	I AS KLIVI KS	, ·	0,1	
T310 timer		ms	1000	
N310			2	B 1 21 2
T1		S	0.2	During this time
				the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	0.37	
T3		S	0.24	
T4		S	0	
T5		S	0.17	
D1		s	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

	Parameter		Unit	Test 1				
				T1	T2	Т3	T4	T5
EPRE rat	io of PDCCH DN	MRS to SSS	dB			Į.		Į.
EPRE rat	io of PDCCH to	PDCCH DMRS	dB					
EPRE rat	io of PBCH DMF	RS to SSS	dB					
EPRE rat	io of PBCH to P	BCH DMRS	dB					
EPRE rat	io of PSS to SS	S	dB			0		
EPRE rat	io of PDSCH DN	/IRS to SSS	dB					
EPRE rat	io of PDSCH to	PDSCH DMRS	dB					
EPRE rat	io of OCNG DM	RS to SSS	dB					
EPRE rat	io of OCNG to C	CNG DMRS	dB					
SNR_SS	B of set q₀	Config 1, 4		5	-3	-12	-12	-12
		Config 2, 5	dB	5	-3	-12	-12	-12
		Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4			-12	-12	5	5	5
SNR_SS	SNR_SSB of set q ₁ Config 2, 5		dB	-12	-12	5	5	5
		Config 3, 6		-12	-12	5	5	5
N_{oc}		Config 1, 4	dBm/15			-98		
1 oc		Config 2, 5	KHz			-98		
		Config 3, 6				-98		
Propagat	ion condition					-C 300ns 1		
Note 1:		e used such that the			•		a constant t	otal
		wer spectral density			,			
	Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.							
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start								
of time period T1. Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.								
Note 4:								
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.								
Note 6:	• • •							
	Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs							

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.4.5.5.1.1-4: Measurement gap configuration for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

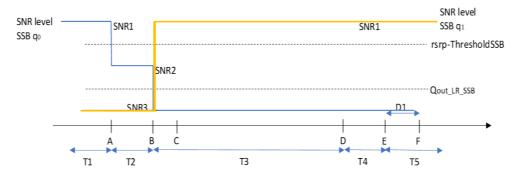


Figure A.4.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [120+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.4.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.2.1-1, A.4.5.5.2.1-2, A.4.5.5.2.1-3, A.4.5.5.2.1-4 and A.4.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired,

i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Paramete	er	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel	Number		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
J	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET	Config 1, 4		CR. 1.1 FDD	
Reference Channel	Config 2, 5		CR. 1.1 TDD	
	Config 3, 6	1	CR. 2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	
	Config 2, 5		SSB.3 FR1	
	Config 3, 6	1	SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6	<u> </u>	SMTC.1	

PDSCH/PDCCH	Config 1, 2,		15 KHz	
subcarrier spacing	4, 5 Config 3, 6		30 KHz	
PRACH	Config 1, 2,		Table A.3.8.2.2-1	
Configuration	4, 5			
	Config 3, 6		Table A.3.8.2.2-1	
SSB Index assigned (q ₀)	as BFD RS		0	
SSB Index assigned	as CBD RS		1	
(q ₁)			OD 4	
OCNG parameters CP length			OP.1 Normal	
Correlation Matrix ar	nd Antenna		2x2 Low	
Configuration	DCI format		1-0	
	Number of		2	
Beam failure	Control			
detection transmission	OFDM symbols			
parameters	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to			
	average CSI- RS RE energy			
	Ratio of	dB	0	
	hypothetical		-	
	PDCCH DMRS energy			
	to average			
	CSI-RS RE			
	energy DMRS		REG bundle size	
	precoder		REO Barialo 6126	
	granularity		•	
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID	Throok old		N.A. absent	When the field
rlmInSyncOutOfSync	ciniesnoia		absent	is absent, the
				UE applies the
				value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used
•			.H- O	for Q _{out_LR_SSB}
powerControlOffsetSS			db0	Used for deriving rsrp-
				ThresholdCSI-
beamFailureInstance	-MayCount		n1	RS see TS 38.321
beam anulemsidile	SiviaxCoulit		111	[7], clause 5.17
beamFailureDetectionTimer			pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS	Config 1, 4		[CSI-RS.1.1 FDD]	
configuration for CSI reporting				
	Config 2, 5		[CSI-RS.1.1 TDD]	

	Config 3, 6		[CSI-RS.2.1 TDD]	
CSI-RS for	Config 1, 4		[TRS.1.1 FDD]	
tracking				
	Config 2, 5		[TRS.1.1 TDD]	
	Config 3, 6		[TRS.1.2 TDD]	
SSB Index assigned	as RLM RS		0,1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time
				the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	5.17	
T3		S	3.24	
T4		S	0	
T5		S	1.97	
D1	·	S	1.93	
AL A AU C		1 4 41		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Paramet	er	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DI	MRS to SSS	dB		•			
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMI	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB			0		
EPRE ratio of PDSCH DI	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_SSB of set q ₁	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6		-12	-12	5	5	5
N_{oc}	Config 1, 4	dBm/15			-98		
i oc	Config 2, 5	KHz			-98		
	Config 3, 6				-98		

Propagat	ion condition		TDL-C 300ns 100Hz	
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total			
	transmitted power spectral density			
Note 2:			ssigned to the UE prior to the start of time period T1.	
Note 3:	NZP CSI-RS resource set configu	ration for C	SI reporting are assigned to the UE prior to the start	
	of time period T1.			
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.			
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period			
	T1.			
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.			
Note 7:	SNR levels correspond to the sign	al to noise	ratio over the SSS REs.	
Note 8:	The SNR in time periods T1, T2, T	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3	
	respectively in figure A.4.5.5.1.1-1.			
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For			
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in			
	clause [A.3.6].		*	

Table A.4.5.5.2.1-4: Void

Table A.4.5.5.2.1-5: Void



Figure A.4.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920 + 10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.4.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.3.1-1, A.4.5.5.3.1-2, and A.4.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.3.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Configuration Description 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 3 LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 6 LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Note: The UE is only required to pass in one of the supported test configurations in FR1

Table A.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5,		TDD	
	6			
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Reference Channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	A.3.10
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	

SMTC Configuration Config 1, 2, 4, 5					1
Description	SMTC Configuration			SMTC.1	A.3.11
DSSCH/PDCCH Subcarrier spacing Config 1, 2, 4,				SMTC.1	
Subcarrier spacing 5	PDSCH/PDCCH				
Config 3, 6 30 KHz					
Description	outeamer spacing			30 KHz	
OCNG parameters				0	
CP length		_		OP 1	A 3 2 1
Correlation Matrix and Antenna Configuration Configuration Configuration DCI format 1-0		_			71.0.2.1
Configuration Beam failure DCI format 1-0 detection Number of 2		Antenna			
DCI format		, and and		ZAZ 2011	
Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DFF State	Beam failure	DCI format		1-0	
Parameters Symbols Aggregation Level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI- RS RE energy DMRS energy to Energy Ener		Number of			
Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to average CSI- RS RE energy to Average CSI- RS RE energy to Average CSI- RS RE energy to Average CSI- RS RE energy to Average CSI- RS RE energy to Average CSI- Average CSI	transmission	Control OFDM			
Level	parameters	symbols			
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Porcoder granularity REG bundle size Precoder		Aggregation	CCE	8	
hypothetical PDCCH RE					
PDCCH RE			dB	0	
energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI- RS RE energy DMRS energy to average CSI- RS RE energy DMRS precoder granularity REG bundle size Foreign REG bundle size Pocch average CSI- RS RE energy DMRS precoder granularity REG bundle size Foreign Foreign Foreign REG bundle size Foreign Foreign					
RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size OFF Gap pattern ID Size N.A. CSI-RS-Index assigned as candidate DEX DRX DIA					
RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDC DMRS precoder granularity REG bundle size PDRX Gap pattern ID N.A. Csi-RS-Index assigned as candidate Deam detection RS in set q1 rimInSyncOutOfSyncThreshold Absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Trsp-ThresholdSSB DeamFailureInstanceMaxCount Deam Graph Deam Gr					
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCH DMRS precoder gr					
hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCM DMRS precoder granularity REG bundle size PDRX					
PDCCH DMRS energy to average CSI- RS RE energy DMRS precoder granularity REG bundle size			dB	0	
energy to average CSI-RS RE energy DMRS DMRS precoder granularity REG bundle size					
average CSI- RS RE energy DMRS DMRS precoder granularity REG bundle size FEG bundle size Precoder granularity REG bundle size Precoder granularity REG bundle size FEG bun					
RS RE energy DMRS precoder granularity REG bundle size Precoder granularity REG bundle G Size DRX OFF OFF					
DMRS precoder granularity REG bundle size					
Precoder granularity REG bundle size 6				DEC homelle eine	
PRX		_		REG bundle size	
DRX					
Size OFF				6	
Sap pattern ID				O	
csi-RS-Index assigned as candidate beam detection RS in set q1 rImInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB dBm -98 Threshold used for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-ThresholdCSI-RS beamFailureInstanceMaxCount n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for q0 and q1 Config 1, 4 CSI-RS.1.2 FDD A.3.14 CSI-RS configuration for CSI reporting Config 1, 4 CSI-RS.1.1 FDD A.3.14 TRS configuration for CSI reporting Config 3, 6 CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.configuration for CSI reporting Config 1, 4 CSI-RS.2.1 TDD A.3.14	DRX			OFF	
csi-RS-Index assigned as candidate beam detection RS in set q1 rImInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB dBm -98 Threshold used for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-ThresholdCSI-RS beamFailureInstanceMaxCount n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for q0 and q1 Config 1, 4 CSI-RS.1.2 FDD A.3.14 CSI-RS configuration for CSI reporting Config 1, 4 CSI-RS.1.1 FDD A.3.14 TRS configuration for CSI reporting Config 3, 6 CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.configuration for CSI reporting Config 1, 4 CSI-RS.2.1 TDD A.3.14	Gap pattern ID			N.A.	
beam detection RS in set q1 rlmlnSyncOutOfSyncThreshold rlmlnSyncOutOfSyncThreshold rlmlnSyncOutOfSyncThreshold rsrp-ThresholdSSB dBm -98 Threshold used for Qin_LR_SSB DeamFailureInstanceMaxCount n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for q0 and q1 CSI-RS configuration for CSI reporting CSI-RS configuration for CSI reporting TRS configuration Config 3, 6 CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD		as candidate		1	
absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB	beam detection RS in	set q ₁			
applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB	rlmInSyncOutOfSyncT	hreshold		absent	When the field is
Called Seconfiguration Config 1, 4 Config 2, 5 Config 3, 6 CSI-RS.2.2 TDD CSI-RS.2.2 TDD Config 3, 6 CSI-RS.2.1 TDD CSI-RS.2.1 TDD Config 3, 6 CSI-RS.2.1 TDD CSI-RS.2.					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
DeamFailureInstanceMaxCount DeamFailureDetectionTimer DeamFailureDetectionTimer					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	rsrp-ThresholdSSB		dBm	-98	
Page 12 Page 14 Page 15 Page 16 Page	powerControlOffsetSS			db0	Used for deriving
RS beamFailureInstanceMaxCount n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], clause 5.17 See TS 38.321 [7], clause 5.17 CSI-RS configuration for qo and q1 Config 1, 4 Config 2, 5 Config 3, 6 CSI-RS.1.2 TDD CSI-RS.2.2 TDD Config 2, 5 Config 3, 6 CSI-RS.1.1 TDD CSI-RS.1.1 TDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	,				rsrp-ThresholdCSI-
beamFailureInstanceMaxCount n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for qo and q1 Config 1, 4 CSI-RS.1.2 FDD A.3.14 CSI-RS configuration for CSI reporting Config 2, 5 CSI-RS.2.2 TDD CSI-RS.1.1 FDD A.3.14 CSI-RS configuration for CSI reporting Config 3, 6 CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS configuration Config 1, 4 TRS.1.1 FDD TRS.1.1 FDD					· · · · · · · · · · · · · · · · · · ·
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	beamFailureInstanceM	1axCount		n1	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	beamFailureDetectionTimer			pbfd4	see TS 38.321 [7],
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	CCL DC agartian matica	Confin 4 4		CCL DC 4 0 EDD	
Config 3, 6 CSI-RS.2.2 TDD			1		A.3.14
CSI-RS configuration for CSI reporting Config 1, 4	ior qo and q1		-		-
Config 2, 5 CSI-RS.1.1 TDD			-		1011
for CSI reporting	CSI-RS configuration		-		A.3.14
Config 3, 6	for CSI reporting				
	-19				
Config 2, 5 TRS.1.1 TDD	TRS configuration				
	garadon	Config 2, 5		TRS.1.1 TDD	

	Config 3, 6		TRS.1.2 TDD			
ani DC Inday	Config 1, 4		CSI-RS.1.2 FDD	A.3.14		
csi-RS-Index assigned as RLM RS	Config 2, 5		CSI-RS.1.2 TDD			
assigned as KLIVI KS	Config 3, 6		CSI-RS.2.2 TDD			
T310 Timer		ms	1000			
N310			2			
T1		S	1	During this time the the UE shall be fully synchronized to cell		
T2		S	0.18			
T3		S	0.14			
T4		S	0			
T5		S	0.08			
D1		S	0.04			
Note 1: UE-specific PDCCH is not transmitted after T1 starts.						

Table A.4.5.5.3.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DM	IRS to SSS	dB				•	
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB			0		
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_CSI-RS of set q1	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6	1	-12	-12	5	5	5
N_{oc}	Config 1, 4	dBm/15			-98		
¹ 'oc	Config 2, 5	KHz			-98		
	Config 3, 6				-98	•	

Propagat	Propagation condition		TDL-C 300ns 100Hz		
Note 1:	OCNG shall be used such that the	resources	in Cell 1 are fully allocated and a constant total		
	transmitted power spectral density	is achieve	ed for all OFDM symbols.		
Note 2:	The uplink resources for CSI report	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.				
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.				
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period				
	T1.				
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.				
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.				
Note 8:	The SNR in time periods T1, T2, T	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3			
	respectively in figure A.4.5.5.1.1-1.				
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For				
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in				
	clause [A.3.6].				

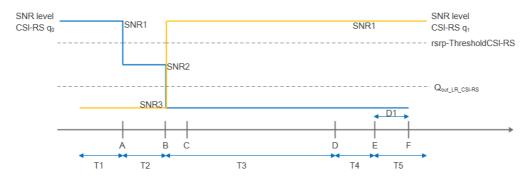


Figure A.4.5.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [30+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.4.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.4.1-1, A.4.5.5.4.1-2, A.4.5.5.4.1-3, and A.4.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.4.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to pass in one of the supported test configurations in FR1

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Paramet	Parameter		Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET Reference	Config 1, 4		CR.1.1 FDD	A.3.1.2
Channel Config 2, 5			CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
SSB Configuration Config 1, 4			SSB.1 FR1	A.3.10
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	

Γ -				1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	A.3.11
	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz	
subcarrier spacing	Config 3, 6		30 KHz	
csi-RS-Index assigned as beam failure			[0]	
detection RS in set q ₀ OCNG parameters			OP.1	A.3.2.1
CP length			Normal	A.J.Z.1
Correlation Matrix and	Antenna Configuration		2x2 Low	
			-	
Beam failure detection	DCI format		1-0	
transmission parameter	S Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	0	
	PDCCH RE energy to average CSI-			
	RS RE energy			
	Ratio of hypothetical PDCCH DMRS	dB	0	
	energy to average CSI- RS RE energy			
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	<u> </u>		DRX.7	A.3.3.7
Gap pattern ID			N.A.	
csi-RS-Index assigned detection RS in set q ₁	as candidate beam		1	
rlmInSyncOutOfSyncTh	nreshold		absent	When the field is
.,				absent, the UE applies the value
rsrp-ThresholdSSB		-ID	00	0. (Table 8.1.1-1). Threshold used for
rsrp-rnresnoid55b		dBm	-98	Q _{in_LR_SSB}
powerControlOffsetSS	powerControlOffsetSS		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceM	axCount		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer			pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	CSI-RS configuration Config 1, 4		CSI-RS.1.2 FDD	A.3.14
for q ₀ and q ₁ Config 2, 5			CSI-RS.1.2 TDD	
	Config 3, 6 Config 1, 4		CSI-RS.2.2 TDD CSI-RS.1.1 FDD	A.3.14
CSI-RS configuration	Config 1, 4	1	CSI-RS.1.1 TDD	A.S. 14
for CSI reporting	Config 3, 6	1	CSI-RS.1.1 TDD	1
	Config 1, 4		TRS.1.1 FDD	
TRS configuration	Config 2, 5		TRS.1.1 TDD	
3 · ··· ·	Config 3, 6	İ	TRS.1.2 TDD	
csi-RS-Index Config 1, 4			CSI-RS.1.2 FDD CSI-RS.1.2 TDD	A.3.14
assigned as RLM RS Config 2, 5			001-NO.1.2 1DD	l

	Config 3, 6		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	8.37	
T3		S	6.44	
T4		S	0	
T5		S	1.97	
D1		S	1.93	
Note 1: UE-sr	pecific PDCCH is not trans	mitted after	T1 starts.	

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DN	/IRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	3	dB			0		
EPRE ratio of PDSCH DN	IRS to SSS	dB					
EPRE ratio of PDSCH to	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_CSI-RS of set q ₁	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6		-12	-12	5	5	5
N_{oc}	Config 1, 4	dBm/15			-98		
1 oc	Config 2, 5	KHz			-98		
	Config 3, 6		-98				
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.4.5.5.4.1-4: Void

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

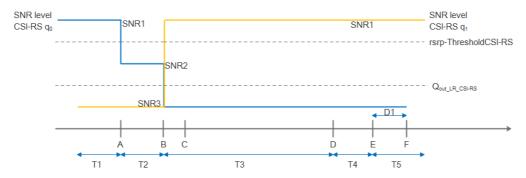


Figure A.4.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.4.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.6 Active BWP switch

A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.4.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.4.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.4.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts.

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations.			
Note 2: A UE which fulfils the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.			

Table A.4.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		l	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	d	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A4.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	eter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.1.2
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP	Config 1,4		
Configuration	Config 2,5		DLBWP.0.2 Note 4
	Config 3,6		
Active DL BWP-1	Config 1,4		
Configuration	Config 2,5		DLBWP.1.1 Note 4
	Config 3,6		
Active DL BWP-2	Config 1,4		
Configuration	Config 2,5]	DLBWP.1.3 Note 4
	Config 3,6		
	Config 1,4		

Initial III DWD	Config 0 F		LIL DWD O 2 Note 4
Initial UL BWP	Config 2,5	1	ULBWP.0.2 Note 4
Configuration	Config 3,6		
Active UL BWP-1	Config 1,4	1	ULBWP.1.1 Note 4
Configuration	Config 2,5	1	ULBVVP.1.1
A ations I II DIA/D O	Config 3,6		
Active UL BWP-2	Config 1,4	1	ULBWP.1.3 Note 4
Configuration	Config 2,5		ULBWP.1.3 Note 4
	Config 3,6		
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
OCNG Patterns	1		OP.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
Correlation Matrix and A	ntenna		1x2 Low
Configuration	Cantin 4.4		TDC 4.4 EDD
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
EDDE ***** -	Config 3,6	d'D	TRS.1.2 TDD
EPRE ratio of PSS to SS		dB	0
EPRE ratio of PBCH by		1	
EPRE ratio of PBCH to F		1	
EPRE ratio of PDCCH D		1	
EPRE ratio of PDCCH to		1	
EPRE ratio of PDSCH to		4	
EPRE ratio of PDSCH to		4	
EPRE ratio of OCNG DM 1)	11/2 (0 222(11016		
EPRE ratio of OCNG to 0	OCNG DMPS	1	
(Note 1)	JOING DIVING		
Noc ^{Note 2}	Config 1,2,4,5	dBm/SCS	[-104]
	Config 3,6	1 32,300	[-101]
N _{oc} Note 2	- 09 0,0	dBm/15kH	[-104]
	,	Z	
SS-RSRP Note 3	Config 1,2,4,5	dBm/SCS	[-87]
A .	Config 3,6		[-90]
Ês/lot		dB	[17]
Ê _s /N _{oc}	T	dB	[17]
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	[-59]
		dBm/	[-61.9]
	Config 3,6	38.16MHz	[50]
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant
	total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled as
	AWGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is
	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.4.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.4.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in SCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	A UE which fulfil	s the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.
Note 3:	NR configuration	is the same for PSCell and SCells.

Table A.4.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		l	test
NR RF Channel Number		2, 3	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	Ů	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	UD	Ů.	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.4.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Paran	neter	Unit	Cell 2	Cell 3	
Frequency Range			FR1		
Duplex mode	Config 1,4		FDD		
	Config 2,3,5,6		TDD		
TDD configuration	Config 1,4		Not Ap	plicable	
Config 2,5			onf.1.1		
	Config 3,6		TDDConf.1.2		
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52		
	Config 2,5		10 MHz: N _{RB,c} = 52		
Config 3,6			40 MHz: N _{RB,c} = 106		
Active BWP ID			1, 2	0	
Initial BWP Config 1,4			DLBWP.0.2	DLBWP.0.2	
Configuration Config 2,5					

Active BWP-0 Config 1.4 Config 2.5 Config 3.6 Active BWP-1 Config 1.4 Config 1.4 Config 3.6 Active BWP-1 Config 1.4 Config 3.6 Active BWP-2 Config 3.6 Active BWP-2 Config 3.6 Active BWP-2 Config 3.6 Active BWP-2 Config 3.6 Config 3.6 PDSCH Reference Config 3.6 Config 3.6 PDSCH Reference Config 3.6 Config 3.6 RMSI CORESET Config 3.6 Config 3.6 Config 3.6 Config 3.6 Config 3.6 RMSI CORESET Config 3.6 Conf		Config 3,6				
Configuration	Active BWP-0			NA	DI BWP 0.2	
Config 3.6				147	B28VI .0.2	
Active BWP-1 Config 2.5 Config 3.6 Active BWP-2 Config 1.4 Config 2.5 Config 3.6 Active BWP-2 Config 3.6 Config 3.6 PDSCH Reference measurement channel Config 2.5 Config 3.6 RMSI CORESET Config 3.6 Config 3.6 Config 3.6 Config 3.6 RMSI CORESET Config 3.6 Config 3.	oomigaranon		1			
Configuration	Active BWP-1			DLBWP.1.3	NA	
Config 3.6						
Active BWP-2 Config 2.5 Config 3.6 PDSCH Reference measurement channel Config 3.6 PDSCH Reference measurement channel Config 3.6 RMSI CORESET Config 3.6 RMSI CORESET Config 3.6 Config 3.6 RMSI CORESET Config 3.6 Config 3	J					
Configuration	Active BWP-2			DLBWP.1.1	NA	
Config 3,6 PDSCH Reference Config 1,4 SR.1.1 FDD	Configuration					
PDSCH Reference measurement channel Config 1.4 SR.1.1 FDD	•					
Config 3,6 SR2.1 TDD	PDSCH Reference			SR.1.	1 FDD	
Config 3,6 SR2.1 TDD	measurement channel	Config 2,5		SR.1.	1 TDD	
Dedicated CORESET Config 3,6 CR.1.1 TDD				SR2.	I TDD	
Config 3,6 CR2.1 TDD	RMSI CORESET	Config 1,4		CR.1.	1 FDD	
Config 3,6 CR2.1 TDD	parameters	Config 2,5		CR.1.	1 TDD	
Config 2,5 Config 3,6 CCR.1.1 TDD				CR2.	I TDD	
Config 3,6 CCR.2.1 TDD	Dedicated CORESET	Config 1,4		CCR.1	.1 FDD	
CORNG Patterns OP.1 SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC Configuration SMTC.1 SMTC.1 TRS Configuration Config 1,4 TRS.1.1 FDD Config 2,5 TRS.1.1 TDD Config 3,6 TRS.1.2 TDD Antenna Configuration 1x2 Propagation Condition AWGN EPRE ratio of PSS to SSS dB 0 EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH to PDCCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 KHz EPRE ratio of OCNG to OCNG DMRS Note 1 Config 1,2,4,5 Ey/lot dB 17 17 Ey/lot dB 17 17 Ey/lot dB 17 17 Ey/lot dB 17 17 Ey/lot dB 17 17 </td <td>parameters</td> <td>Config 2,5</td> <td></td> <td>CCR.1</td> <td>.1 TDD</td>	parameters	Config 2,5		CCR.1	.1 TDD	
Configuration		Config 3,6		CCR.2	.1 TDD	
Config 3,6 SSB.2 FR1	OCNG Patterns					
SMTC Configuration SMTC.1 TRS Configuration Config 1,4 TRS.1.1 FDD Config 2,5 TRS.1.1 TDD Config 3,6 TRS.1.2 TDD Antenna Configuration 1x2 Propagation Condition AWGN EPRE ratio of PSS to SSS dB 0 EPRE ratio of PBCH DMRS to SSS 6 0 EPRE ratio of PBCH to PBCH DMRS 6 0 EPRE ratio of PDCCH DMRS to SSS 6 0 EPRE ratio of PDCCH DMRS to SSS 0 0 EPRE ratio of PDSCH to PDSCH 0 0 EPRE ratio of PDSCH to PDSCH 0 0 EPRE ratio of OCNG DMRS to SSS Note 1 0 0 EPRE ratio of OCNG to OCNG DMRS Note 1 0 0 EPRE ratio of OCNG to OCNG DMRS Note 1 0 0 EPRE ratio of OCNG to OCNG to OCNG DMRS Note 1 0 0 EPRE ratio of OCNG to OCNG to OCNG DMRS Note 1 0 0 EPRE ratio of OCNG to	SSB Configuration	SSB Configuration Config 1,2,4,5		SSB.	1 FR1	
Configuration		Config 3,6		SSB.2 FR1		
Config 2,5	SMTC Configuration					
Config 3,6	TRS Configuration			TRS.1	.1 FDD	
Antenna Configuration			TRS.1.1 TDD			
Propagation Condition		Config 3,6				
## BPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 ES/Not	Antenna Configuration					
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS Note 1 Noc Note 2						
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS Note 1 BPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 BPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH to PDSCH EPRE ratio of PDSCH			dB	0	0	
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2						
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2						
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2 dBm/15 kHz [-104] [-104] SS-RSRP Note 3 dBm/15 kHz [-87] [-87] Ês/lot dB 17 17 Ês/Noc dB 17 17 IoNote3 Config 1,2,4,5 dBm/ 9.36MHz [-59] [-59] Config 3,6 dBm/ [-61.9] [-61.9]						
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2 dBm/15 kHz [-104] [-104] SS-RSRP Note 3 dBm/15 kHz [-87] [-87] Ês/lot dB 17 17 Ês/Noc dB 17 17 IoNote3 Config 1,2,4,5 dBm/ g.36MHz [-59] [-59] Config 3,6 dBm/ [-61.9] [-61.9]						
EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2 dBm/15						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Noc Note 2 dBm/15						
KHz		OCNG DMRS Note 1	ID /45	F 4047	F 40 41	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			kHz			
Ês/Noc dB 17 17 IoNote3 Config 1,2,4,5 dBm/ 9.36MHz [-59] [-59] Config 3,6 dBm/ [-61.9] [-61.9]	SS-RSRP Note 3			[-87]	[-87]	
Ês/Noc dB 17 17 IoNote3 Config 1,2,4,5 dBm/ 9.36MHz [-59] [-59] Config 3,6 dBm/ [-61.9] [-61.9]	Ê _s /I _{ot}			17	17	
Config 1,2,4,5	Ê _s /N _{oc}		dB	17	17	
Config 3 6 dBm/ [-61.9] [-61.9]	Io ^{Note3}	Config 1,2,4,5		[-59]	[-59]	
		Config 3,6		[-61.9]	[-61.9]	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(j+T_{BWPswitchDelay}+k11)$.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of k1 for type 1 and type 2 UE.

A.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.4.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.4.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part configuration.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.4.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	quired to be tested in one of the supported test configurations

Table A.4.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	מם	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	αĎ	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	

Table A.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

	Paramet	er	Unit	Cell 2
Frequency	Range			FR1
Duplex mod	de	Config 1,4		FDD
		Config 2,3,5,6		TDD
TDD config	uration	Config 1,4		Not Applicable
		Config 2,5		TDDConf.1.1
		Config 3,6		TDDConf.1.2
BW _{channel}		Config 1,4		10 MHz: N _{RB,c} = 52
		Config 2,5		10 MHz: N _{RB,c} = 52
		Config 3,6		40 MHz: N _{RB,c} = 106
Active DL B				1
Initial DL B\		Config 1,4		DLBWP.0.2
Configuration	on	Config 2,5		
		Config 3,6		
Initial UL B\		Config 1,4		ULBWP.0.2
Configuration	on	Config 2,5		
		Config 3,6		
Initial	Active DL	Config 1,4		DLBWP.1.3
Condition	BWP-1	Config 2,5		
	Configurat ion	Config 3,6		
	Active UL	Config 1,4		ULBWP.1.3
	BWP-1	Config 2,5	İ	
	Configurat		İ	
Final	ion Active DL	Config 3,6 Config 1,4		DLBWP.1.1
Condition	BWP-1		}	DLBVVP.1.1
Condition	Configurat	Config 2,5	}	
	ion	Config 3,6		
	Active UL	Config 1,4		ULBWP.1.1
	BWP-1	Config 2,5		
	Configurat ion	Config 3,6		
Initial UL B\	NΡ	Config 1,4		ULBWP.0.2
Configuration	on	Config 2,5		
		Config 3,6		
Active UL B		Config 1,4		ULBWP.1.3
Configuration	on	Config 2,5		
		Config 3,6		
Active UL B		Config 1,4		ULBWP.1.1
Configuration	on	Config 2,5	ļ	
		Config 3,6		
PDSCH Re		Config 1,4		SR.1.1 FDD
measureme	ent channel	Config 2,5		SR.1.1 TDD
D140: 00=	FOFT	Config 3,6		SR2.1 TDD
RMSI COR		Config 1,4		CR.1.1 FDD
parameters		Config 2,5		CR.1.1 TDD
D	200505	Config 3,6		CR2.1 TDD
Dedicated (Config 1,4		CCR.1.1 FDD
parameters		Config 2,5		CCR.1.1 TDD
OCNO Dati	0.000	Config 3,6		CCR.2.1 TDD
OCNG Patt		O		OP.1
SSB Config	juration	Config 1,2,4,5		SSB.1 FR1
SMTC Configuration		Config 3,6		SSB.2 FR1
		Canfin 4 4		SMTC.1
TRS Config	juration	Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
A		Config 3,6		TRS.1.2 TDD
Antenna Co	ontiguration			1x2

Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS	to SSS		
EPRE ratio of PBCH to PBC	H DMRS		
EPRE ratio of PDCCH DMR	S to SSS		
EPRE ratio of PDCCH to PD	CCH DMRS]	
EPRE ratio of PDSCH DMR	S to SSS]	
EPRE ratio of PDSCH to PD	SCH		
EPRE ratio of OCNG DMRS	to SSS(Note 1)		
EPRE ratio of OCNG to OCN	NG DMRS (Note 1)		
N _{oc} Note 2		dBm/15	[-104]
		kHz	
SS-RSRP Note 3		dBm/15	[-87]
		kHz	
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Config 1 2 4 5	dBm/	[-59]
	Config 1,2,4,5	9.36MHz	
	Config 2 6	dBm/	[-61.9]
	Config 3,6	38.16MHz	
Note 1: OCNG shall be	e used such that bot	th cells are full	y allocated and a constant
total transmitte	ed power spectral de	ensity is achiev	ed for all OFDM symbols.
Note 2: Interference from	om other cells and r	noise sources r	not specified in the test is
assumed to be	constant over subc	carriers and tim	ne and shall be modelled
as AWGN of a	ppropriate power fo	r N₀c to be fulfi	lled.
			other parameters for
			meters themselves.
1	•	•	an UL BWP. DLBWP.0.2
· ·	JLBWP.0.2; DLBWF		
	linked with ULBWP		•
TS 38.213 [3].			

A.4.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot ($i + T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.7 PSCell addition and release delay

A.4.5.7.1 Addition and Release Delay of known NR PSCell

A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T5.

Configuration Description LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD 2 3 LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD 4 LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD 5 LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD 6 LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD Note: The UE is only required to pass in one of the supported test configurations in FR1

Table A.4.5.7.1.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter		Unit	Value	Comment	
RF Channel Number		1, 2		Two radio channels are used for this test. One	
			1, 2	for E-UTRA cell and second for NR Cell	
Initial	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.	
Final	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.	
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.	
	Threshold	dBm	-93	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in clause	
				9.1.11.1 into account plus margin.	
	Time to Trigger	S	0		

DRX		OFF	Continuous monitoring of primary cell
Measurement gap pattern ld		0	Gaps are configured before T2 and released before T3.
PRACH configuration on cell2		FR1 PRACH configuration 2	Captured in A.3.8.2.1
CQI/PMI periodicity and offset configuration index on cell2		[2ms]	CQI reporting for PSCell every uplink subframe
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on carrier frequency of cell2.
T1	s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2	s	1	During this time the UE shall identify neighbour cell (cell2) and report event B1.
T3	S	0.5	During this time the UE adds the PSCell.
T4	s	0.5	During this time the UE sends CSI reports for PSCell.
T5	S	0.5	During this time the UE releases the PSCell.

Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Confin	Test						
Parameter	Unit	Config	T1	T2	T3	T4	T5		
E-UTRA RF Channel Number		1,2,3,4,5,6	1						
NR RF Channel Number		1,2,3,4,5,6			2				
TDD		1,4		N	ot Applicat	ole			
configuration		2,5		T	DDConf.1	.1			
		3,6		Т	DDConf.1	.2			
		1,4		10	0: N _{RB,c} = \$	52			
BW _{channel}	MHz	2,5		10: N _{RB,c} = 52					
		3,6	40: N _{RB,c} = 106						
Initial BWP Configuration	1,2,3 DLBWP.0.1 ULBWP.0.1								
Dedicated BWP Configuration		1,2,3		· -	OLBWP.1. JLBWP.1.	-			
PDSCH		1,4		9	SR.1.1 FD	D			
Reference		2,5		5	SR.1.1 TD	D			
measurement channel		3,6		5	SR.2.1 TD	D			
RMSI CORESET		1,4		(CR.1.1 FD	D			
Reference		2,5		(CR.1.1 TD	D			
Channel		3,6		(CR.2.1 TD	D			
Dedicated		1,4		С	CR.1.1 FC	DD O			
CORESET		2,5		С	CR.1.1 TE	DD			
Reference Channel		3,6		С	CR.2.1 TE	DD			
OCNG Patterns	-	1,2,3,4,5,6	•		OP.1		-		
SSB		1,2,4,5			SSB.1 FR	1			
configuration		3,6			SSB.2 FR	1			

SMTC		1,2,4,5		SMTC.1
configuration		3,6		SMTC.1
		1,4		TRS.1.1 FDD
TRS		2,5		TRS.1.1 TDD
Configuration		3,6		TRS.1.2 TDD
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to				
SSS EPRE ratio of PBCH to PBCH				
DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to	dB	1,2,3,4,5,6		0
PDCCH DMRS EPRE ratio of	ub.	1,2,3,4,3,0		0
PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
$N_{oc}^{}$ Note2	dBm/15 kHz	1,2,3,4,5,6	N/A	-85
N_{oc} Note2	dBm/SCS	1,2,4,5	N/A	-85
- 'oc	GDI11/3003	3,6	N/A	-82
\hat{E}_{s}/I_{ot}		1,2,3,4,5,6	-infinity	0
\hat{E}_s/N_{oc}		1,2,3,4,5,6	-infinity	0
SS-RSRP ^{Note3}	dDm/CCC	1,2,4,5	-infinity	-85
	dBm/SCS	3,6	-infinity	-82
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	N/A	-57
	dBm/38.1MHz	3,6	N/A	-51
Propagation condition		1,2,3,4,5,6	'	AWGN
Note 1: OCNG	shall be used suc	h that both co	lle are fully	allocated and a constant total

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference

and noise at each receiver antenna port.

Note 3:

A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 82 ms^{Note1} into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest [20]ms into T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2msWhere$$
:

 $T_{RRC_delay} = 20 \text{ms}$

 $T_{processing} = 20 ms$

 $T_{search} = 0$

 $T_{\Delta} = 20ms$

 $T_{PSCell_DU} = 1*10+10 = 20ms$

A.4.6 Measurement procedure

A.4.6.1 Intra-frequency Measurements

A.4.6.1.1 EN-DC event triggered reporting tests without gap under non-DRX

A.4.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.1.2-1, A.4.6.1.1.2-2, A.4.6.1.1.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.1.2-1: Supported test configurations

Co	onfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.4.6.1.1.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.4.6.1.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test	Ce	Cell 2		ell 3	
		configuration		T2	T1	T2	
TDD configuration		1	N/A		N	I/A	
		2	TDDC	onf.1.1	TDDConf.1.1		
		3	TDDC	TDDConf.2.1		onf.2.1	
PDSCH RMC		1	SR.1.	SR.1.1 FDD		N/A	
configuration		2	SR.1.	.1 TDD	7		
		3	SR.2.1 TDD				
RMSI CORESET		1	CR.1	CR.1.1 FDD		.1 FDD	
RMC		2	CR.1.	.1 TDD	CR.1.	.1 TDD	
configuration	3 CR.2.1 TE		.1 TDD	CR.2	.1 TDD		

Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD		
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD		
configuration		3	CCR.2	.1 TDD	CCR.2.1 TDD			
OCNG Patterns		1, 2, 3	1	P.1	OF			
TRS configuration		1		.1 FDD		N/A		
ŭ		2	TRS.1	TRS.1.1 TDD		/A		
		3	TRS.1	.2 TDD	N,	/A		
Initial BWP		1, 2, 3	DLBV	/P.0.1	DLBW	/P.0.1		
configuration		, ,	ULBV	/P.0.1	ULBW	/P.0.1		
Active DL BWP configuration		1, 2, 3	DLBV	/P.1.1	DLBW	/P.1.1		
Active UL BWP configuration		1, 2, 3	ULBWP.1.1 ULBWP.1.1			/P.1.1		
RLM-RS		1, 2, 3	SSB SSB					
N_{oc} Note 2	dBm/SCS	1	-98					
TV _{oc}		2				-98		
		3		-95				
$N_{oc}^{$	dBm/15 kHz	1	-98					
oc .		2						
		3	1					
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46		
S/ ot		2						
		3						
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4		
$= s / 1 \cdot oc$		2						
Nu.		3						
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94		
		2	-94	-94	-Infinity	-94		
		3	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25		
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25		
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16		
Propagation Condition		1, 2, 3	AWGN					

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.2 EN-DC event triggered reporting tests without gap under DRX

A.4.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.2.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.2.1-1, A.4.6.1.2.1-2, A.4.6.1.2.1-3 and A.4.6.1.2.1-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.2.2-1: Supported test configurations

	Configuration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.4.6.1.2.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Ce	II 1 and NR	
			Cell 2		
Neighbour cell		1, 2, 3	NR Cell 3		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1		
			2: Cell 2 and	Cell 3	
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
2		2	SMTC.1		
		3	SMTC.1		

A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.4.6.1.2.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Ce	II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	/A	N/A		
		2	TDDConf.1.1		TDDConf.1.1		
		3	TDDC	onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2	2.1 TDD	CCR.2	.1 TDD	
OCNG Patterns		1, 2, 3	0	OP.1 OP.1		P.1	
TRS configuration		1	TRS.1.1 FDD		N/A		
		2	TRS.1.1 TDD TRS.1.2 TDD		N/A		
		3			N/A		
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBWP.0.1		
configuration			ULBV	VP.0.1	ULBWP.0.1		
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBV	DLBWP.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBV	VP.1.1	
configuration							
RLM-RS		1, 2, 3	S	SB		SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1			-98		
oc .		2			-98		
		3			-95		
$N_{oc}^{$	dBm/15 kHz	1			-98		
		2					
•	·ID	3	-	1.40	-Infinity	4.40	
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$	dB	1	4	4 -1.46		-1.46	
5 / Ot		2	-				
A /	dD	3	4	4	Infinit:	4	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
57 00		2					

		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16
Propagation		1, 2, 3	AWGN			
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm ac}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.3 EN-DC event triggered reporting tests with per-UE gaps under non-DRX

A.4.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.3.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.3.1-1 and A.4.6.1.3.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.4.6.1.3.2-1: Supported test configurations

Co	onfiguration	Description				
	1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only required to be tested in one of the supported test configurations.					

Table A.4.6.1.3.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	s	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.4.6.1.3.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test	Cell 2		Cell 3		
		configuration	T1 T2		T1	T2	

	1	N	/Λ	N.	/Λ
	·				
-					
-				,	
-					
				CR 1	1 EDD
_	<u> </u>				
-					
_					
	•				
_				-	
				N/A	
	1, 2, 3			DLBWP.0.1	
	4.0.0			ULBWP.0.1 DLBWP.1.1	
	1, 2, 3	DLBV	VP.1.2	DLBW	/P.1.1
	1 2 2	I II D\/	LII RW/D 1.2		/D 1 1
	1, 2, 3	OLDV	OLBWF.1.2 OLBWF.		/ [.] .]
	1 2 3	CSI	CSI-RS SSB		SB
dBm/SCS					
abiii, 666					
dBm/15 kHz					
	3				
dB	1	4	-1.46	-Infinity	-1.46
	2				
	3				
dB	1	4	4	-Infinity	4
	2			-	
	3				
dBm/SCS kHz	1	-94	-94	-Infinity	-94
	2	-94	-94	-Infinity	-94
		-91	-91	-Infinity	-91
	3	_	_		
dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25
dBm/9.36 MHz	1 2	-64.60 -64.60	-62.25 -62.25	-64.60 -64.60	-62.25
	1 2 3	-64.60	-62.25 -62.25 -56.16	-64.60 -64.60 -58.50	
dBm/9.36 MHz	1 2	-64.60 -64.60	-62.25 -62.25 -56.16	-64.60 -64.60	-62.25
		2 3 dBm/15 kHz 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 1 2 1	2 TDDC 3 TDDC 1 SR.1. 2 SR.1. 2 SR.1. 3 SR.2. 1 CR.1. 2 CR.1. 3 CR.2. 1 CCR.1 2 CCR.1 3 CCR.2 1 CCR.1 3 CCR.2 1, 2, 3 Of 1 TRS.1 2 TRS.1 3 TRS.1 3 TRS.1 1, 2, 3 DLBW ULBW 2 TDDConf.1.1 3 TDDConf.2.1 4 SR.1.1 FDD 2 SR.1.1 TDD 3 SR.2.1 TDD 4 CR.1.1 FDD 2 CR.1.1 TDD 3 CR.2.1 TDD 4 CCR.1.1 FDD 5 CCR.1.1 TDD 5 CCR.1.1 TDD 6 CCR.1.1 TDD 7 CCR.1.	2	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.4 EN-DC event triggered reporting tests with per-UE gaps under DRX

A.4.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.4.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.4.2-1, A.4.6.1.4.2-2, A.4.6.1.4.2-3 A.4.6.1.4.2-4 and A.4.6.1.4.2-5 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.4.2-1: Supported test configurations

Co	onfiguration	Description				
	1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only required to be tested in one of the supported test configurations.					

Table A.4.6.1.4.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test	Value		Comment
		configur ation	Test 1	Test 2	

A - (II		1400	E LITDANI O JII 4 JAID	
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR	
NI a lada basana a di		1 0 0	Cell 2	Oall talka idaatifaat
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1	
			2: Cell 2 and Cell 3	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition	ms	1, 2, 3	40	
periodicity				
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
·		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient	<u> </u>	1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	DRX.1 DRX.2	Le internig to free deed
Time offset between PCell		1, 2, 3	3 μs	Synchronous EN-DC
and PSCell		1, 2, 3	ο μο	Cynomonous EN DO
Time offset between serving	1	1	3 ms	Asynchronous cells.
and neighbour cells		1 '	o mo	The timing of Cell 3 is 3ms later
and noighbodh coile				than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3		Synchronous cells
T4	<u> </u>		3 μs	Synchronous cens
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5 10	

Table A.4.6.1.4.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Cell 3	
		configuration	T1	T2	T1	T2
TDD configuration		1	N.	/A	N/A	
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDConf.2.1		TDDC	onf.2.1
PDSCH RMC		1	SR.1.	1 FDD	N.	/A
configuration		2	SR.1.	1 TDD		
		3	SR.2.1 TDD			
RMSI CORESET		1	CR.1.1 FDD		CR.1.1 FDD	
RMC		2	CR.1.1 TDD CR.2.1 TDD		CR.1.1 TDD	
configuration		3			CR.2.1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1.1 FDD	
CORESET RMC		2	CCR.1.1 TDD		CCR.1.1 TDD	
configuration		3	CCR.2.1 TDD		CCR.2	.1 TDD
OCNG Patterns		1, 2, 3	OP.1		OP.1 OP.1	
TRS configuration	_	1	TRS.1.	1 FDD	N.	/A
		2	TRS.1.	.1 TDD	N.	/A

	1, 2, 3	DI BW				
	, , -	DLBWP.0.1 DLBWP.0.1		/P.0.1		
		ULBV	VP.0.1	ULBW	/P.0.1	
	1, 2, 3	DLBV	VP.1.2	DLBW	/P.1.1	
	1, 2, 3	ULBV	VP.1.2	ULBW	/P.1.1	
	1, 2, 3	CSI-RS SSB				
dBm/SCS	1		-	98		
	2		-	.98		
	3		-	·95		
dBm/15 KHz	1	-98				
	2					
	3					
dB	1	4	-1.46	-Infinity	-1.46	
	2					
	3					
dB	1	4	4	-Infinity	4	
	2					
	3					
dBm/SCS KHz	1	-94	-94	-Infinity	-94	
	2	-94	-94	-Infinity	-94	
	3	-91	-91	-Infinity	-91	
dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25	
dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25	
dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16	
	1, 2, 3		AWGN			
	dBm/15 KHz dB dB dB dBm/SCS KHz dBm/9.36 MHz dBm/9.36 MHz	1, 2, 3 dBm/SCS 1, 2, 3 dBm/SCS 1 2 3 dBm/15 KHz 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dB 1 2 3 dBm/SCS KHz 1 2 3 dBm/SCS KHz 1 2 3 dBm/9.36 MHz dBm/9.36 MHz dBm/9.36 MHz dBm/9.36 MHz 3	1, 2, 3 ULBW 1, 2, 3 CSI dBm/SCS 1 2 3 dBm/15 KHz 1 2 3 dB 1 4 2 3 dB 1 4 2 3 dB 1 4 2 3 dB 1 4 2 3 dB 1 4 2 3 dB 1 4 2 3 dBm/SCS KHz 1 -94 2 -94 3 -91 dBm/9.36 MHz dBm/9.36 MHz dBm/9.36 MHz dBm/9.36 MHz dBm/38.16 MHz 3 -58.50	1, 2, 3 ULBWP.1.2 1, 2, 3 CSI-RS dBm/SCS 1 2 3 dBm/15 KHz 1 2 3 dB 1 4 -1.46 2 3 dB 1 4 4 -1.46 2 3 dBm/SCS KHz 1 -94 -94 -94 -94 3 -91 -91 -91 dBm/9.36 MHz dBm/9.36 MHz dBm/9.36 MHz dBm/38.16 MHz 3 -58.50 -56.16	1, 2, 3 ULBWP.1.2 ULBW 1, 2, 3 CSI-RS SS dBm/SCS 1 -98 2 -98 3 -95 dBm/15 KHz 1 -98 2 3 dB 1 4 -1.46 -Infinity 2 3 dB 1 4 4 -Infinity 2 3 dBm/SCS KHz 1 -94 -94 -Infinity 2 -94 -94 -Infinity dBm/9.36 MHz 1 -64.60 -62.25 -64.60 dBm/9.36 MHz 2 -64.60 -62.25 -64.60 dBm/9.36 MHz 2 -64.60 -62.25 -64.60 dBm/9.36 MHz 3 -58.50 -56.16 -58.50	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.5 EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading

A.4.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.5.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for FDD PSCell are given in Table A.4.6.1.5.1-1 and A.4.6.1.5.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.4.6.1.5.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	s	1	5	

Table A.4.6.1.5.1-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2		Ce	II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	/A	N	/A	
PDSCH RMC		1	SR.1.	SR.1.1 FDD		N/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1		P.1		P.1	
TRS configuration		1	TRS.1.1 FDD		N/A		
Initial BWP		1		DLBWP.0.1		DLBWP.0.1	
configuration			ULBWP.0.1		ULBWP.0.1		
Active DL BWP		1	DLBWP.1.1		DLBWP.1.1		
configuration			=				
Active UL BWP		1	ULBV	VP.1.1	ULBV	VP.1.1	
configuration			<u> </u>				
RLM-RS	i= /aaa	1	S	SB	l .	SB	
$N_{oc}^{$	dBm/SCS	1		-	-98		
$N_{_{OC}}$ Note 2	dBm/15 kHz	1		-	-98		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94 -94		-94	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25	
Propagation		1	AWGN				
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\it oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.6 EN-DC event triggered reporting tests with SSB index reading with per-UE gaps

A.4.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.6.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.6.2-1 A.4.6.1.6.2-2 and A.4.6.1.6.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.4.6.1.6.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.4.6.1.6.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

Table A.4.6.1.6.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2		Cell 3	
		configuration	T1	T2	T1	T2

TDD configuration		1	N/	/A	N/	/A		
PDSCH RMC		1	SR.1.	1 FDD	N/	/A		
configuration								
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD		
RMC								
configuration								
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD		
CORESET RMC								
configuration								
OCNG Patterns		1	OF		OF	P.1		
TRS configuration		1	TRS.1.	1 FDD	N/	/A		
Initial BWP		1	DLBW	/P.0.1	DLBW			
configuration			ULBW	LBWP.0.1 ULBWP.0.1				
Active DL BWP		1	DLBW	DLBWP.1.2 DLBWP.1.1				
configuration								
Active UL BWP		1	ULBW	ULBWP.1.2 ULBWP.1.1				
configuration								
RLM-RS		1	CSI			SB		
$N_{oc}^{}$ Note 2	dBm/SCS	1		-	.98			
Noc Note 2	dBm/15 kHz	1		-	·98			
\hat{E}_{s}/I_{ot}	dB	1	4	-1.46	-Infinity	-1.46		
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4		
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94 -94 -Infinity -94				
lo	dBm/9.36 MHz	1	-64.60					
Propagation		1		AWGN				
Condition	_							
Note 1: The reso	urces for uplink transn	nission are assign	ed to the UE	orior to the	start of time	period		
Τ0								

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.6.3 **Test Requirements**

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement NOTE: reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2 Inter-frequency Measurements

A.4.6.2.1 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

A.4.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.1.1-1, A.4.6.2.1.1-2, and A.4.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.1.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.1.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.1.1-1.

Table A.4.6.2.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	target NR cell3 h	as the same SCS, BW and duplex mode as NR serving cell2

Table A.4.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati	Test 1 Test 2		
		on			

E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6		Į.	frequencies is used.
NR RF Channel		Config	1	, 2	Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6	1, 2		used.
Number		1,2,0,4,0,0			docu.
Active cell		Config	LTE Cell 1 (P	Cell) and NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (PScell)		channel number 1.
			, ,		NR Cell 2 is on NR RF channel
					number 1.
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel
		1,2,3,4,5,6			number 2.
Gap Pattern Id		Config	0	4	As specified in clause 9.1.2-1.
		1,2,3,4,5,6			
Measurement gap		Config	39	9	
offset		1,2,3,4,5,6			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		0 " 00	000 0 504		A
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config	-6		
A3-Oliset	иь	1,2,3,4,5,6	-6		
Hysteresis	dB	Config	0		
Trysteresis	ub.	1,2,3,4,5,6			
CP length		Config	Normal		
J. lengar		1,2,3,4,5,6	- Norman		
TimeToTrigger	s	Config	0		
		1,2,3,4,5,6			
Filter coefficient		Config	0		L3 filtering is not used
		1,2,3,4,5,6			
DRX		Config	OFF		DRX is not used
		1,2,3,4,5,6			
Time offset between		Config	3 μs		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6			
Time offset between		Config 1,4	3ms		Asynchronous cells.
serving and neighbour					The timing of Cell 3 is 3ms later
cells		Confic			than the timing of Cell 2.
		Config	3μs		Synchronous cells.
		2,3,5,6			
T1	S	Config	5		
' '	3	1,2,3,4,5,6			
T2	S	Config	1	1	
. =		1,2,3,4,5,6			
	l	۰,۷,۰,۳,۰,۰	1	l	

Table A.4.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3			
		configuratio	T1 T2		T1	T2		
		n						
NR RF Channel Number		Config		1		2		
		1,2,3,4,5,6						
Duplex mode		Config 1,4		F	DD			
		Config		T	DD			
		2,3,5,6						
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52					
		Config 2.5		10: N _R	B.c = 52			

		Config 3,6		40: N _R	_{B,c} = 106			
BWP BW	MHz	Config 1,4				B,c = 52		
5 5		Config 2,5		10: N	RB,c = 52			
		Config 3,6			B,c = 106			
TDD configuration		Config 2,5	TDDC	onf.1.1		Conf.1.1		
		Config 3,6		onf.2.1		Conf.2.1		
Initial DL BWP		Config		VP.0.1	1	NA		
		1,2,3,4,5,6						
Initial UL BWP		Config	UI BV	VP.0.1		NA		
		1,2,3,4,5,6	022.					
Dedicated DL BWP		Config	DI BV	VP.1.1		NA		
200.000.00 22200		1,2,3,4,5,6						
Dedicated UL BWP		Config	ULBV	VP.1.1		NA		
		1,2,3,4,5,6						
TRS configuration		Config 1,4	TRS.1	.1 FDD		NA		
3		Config 2,5		.1 TDD		NA		
		Config 3,6		.2 TDD		NA		
OCNG Patterns defined in		Config	11.0.1			, .		
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	\cap	P.1		OP.1		
PDSCH Reference					 			
measurement channel		Config 1,4		1 FDD	4	-		
measurement thanflet		Config 2,5		1 TDD	_			
		Config 3,6	SR2.	1 TDD				
CORESET Reference		Config 1,4	CR.1.	1 FDD		-		
Channel		Config 2,5	CR.1.	1 TDD				
		Config 3,6	CR2.	1 TDD				
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SMTC.5			
		Config 2,3,5,6	SM	TC.1	SMTC.4			
PDSCH/PDCCH subcarrier	kHz	Config			4.5			
spacing		1,2,4,5			15			
		Config 3,6			30			
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS								
to SSS EPRE ratio of PBCH to PBCH					1			
DMRS								
EPRE ratio of PDCCH DMRS	<u> </u>							
to SSS					1			
EPRE ratio of PDCCH to								
PDCCH DMRS		Config		0	1	0		
		1,2,3,4,5,6				· ·		
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to								
PDSCH								
EPRE ratio of OCNG DMRS								
to SSS(Note 1)								
EPRE ratio of OCNG to								
OCNG DMRS (Note 1)								
Note2	dBm/15			08		-98		
N _{oc}	kHz		-98			-90		
Note2		Confin		00		00		
N_{oc}	dBm/S	Config		98	1	-98		
	CS	1,2,4,5		0.5		0.5		
OO DODD Note 3	ID (2	Config 3,6		95	1.6.3	-95		
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91		
		Config 3,6	-91	-91	-Infinity	-88		

Ê s /I ot	dB	Config	4 4 -Infinity 7		7	
		1,2,3,4,5,6				
\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	-64.59	-64.59	-70.05	-62.26
	36MHz	1,2,4,5				
	dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15
	.16MHz	_				
Propagation Condition		Config		ΑV	/GN	
		1.2.3.4.5.6				

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.2 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

A.4.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.2.1-1, A.4.6.2.2.1-2, and A.4.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.2.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.2.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

С	onfig	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	target NR cell3 h	as the same SCS, BW and duplex mode as NR serving cell2

Table A.4.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config		•	1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequencies is used.
NR RF Channel		Config		1,	2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config 1,2,3,4,5,6	cell 2 ((PScell)	Cell) and	INR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39		9		
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3,4,5,6	-6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
CP length		Config 1,2,3,4,5,6	Norma	ıl			
TimeToTrigger	S	Config 1,2,3,4,5,6	0				

Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µѕ				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.1	11	1.1	11	

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Ce	Cell 2		Cell 3	
		configuratio	T1	T2	T1	T2	
		n					
NR RF Channel Number		Config	1 2				
		1,2,3,4,5,6			1		
Duplex mode		Config 1,4			FDD		
		Config			TDD		
514		2,3,5,6					
BW _{channel}	MHz	Config 1,4			$N_{RB,c} = 52$		
		Config 2,5			$N_{RB,c} = 52$		
		Config 3,6			_{RB,c} = 106		
BWP BW	MHz	Config 1,4			V _{RB,c} = 52		
		Config 2,5			$N_{RB,c} = 52$		
		Config 3,6			$_{RB,c} = 106$		
TDD configuration		Config 2,5	TDDC	onf.1.1	TDD	Conf.1.1	
		Config 3,6	TDDC	onf.2.1	TDD	Conf.2.1	
Initial DL BWP		Config	DLBV	DLBWP.0.1		NA	
		1,2,3,4,5,6					
Initial UL BWP		Config	ULBV	VP.0.1		NA	
		1,2,3,4,5,6					
Dedicated DL BWP		Config	DLBV	VP.1.1		NA	
		1,2,3,4,5,6					
Dedicated UL BWP		Config	UI BV	VP.1.1		NA	
		1,2,3,4,5,6					
TRS configuration		Config 1,4	TRS 1	.1 FDD		NA	
Trib sermigaranen		Config 2,5		.1 TDD		NA	
		Config 3,6		.1 TDD .2 TDD	1	NA	
OCNG Patterns defined in		Config	11(0.1	.2 100		INA	
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	\cap	OP 4		OP.1	
PDSCH Reference	+		OP.1		 	١.١	
measurement channel		Config 1,4	SR.1.1 FDD -		-		
measurement channel		Config 2,5	SR.1.1 TDD				
		Config 3,6		1 TDD			
CORESET Reference		Config 1,4		1 FDD	_]	-	
Channel		Config 2,5		1 TDD	_]		
		Config 3,6	CR2.	1 TDD			

SMTC configuration defined in A.3.11		Config 1,4	SMT	C.2	SM	ITC.5	
		Config 2,3,5,6	SMT	TC.1	SMTC.4		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5			15		
		Config 3,6			30		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS						0	
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	()			
EPRE ratio of PDSCH DMRS to SSS		1,=,=,1,1,=,=					
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Note2 Noc	dBm/15 kHz		-0	18	-98		
Note2 N_{oc}	dBm/S CS	Config 1,2,4,5	- <u>G</u>	8	-	.98	
		Config 3,6	-9	5	-	·95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-91	-91	-Infinity	-88	
Ê s /I ot	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4 4		-Infinity	7	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26	
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3,4,5,6		A	WGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

- A.4.6.2.3 Void
- A.4.6.2.4 Void
- A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description				
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6		LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table A.4.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier		
Number		1,2,3,4,5,6			frequencies is used.		
NR RF Channel		Config	1, 2		Two FR1 NR carrier frequencies is		
Number		1,2,3,4,5,6			used.		
Active cell		Config	LTE Cell 1 (PCell) and NR		LTE Cell 1 is on E-UTRA RF		
		1,2,3,4,5,6	cell 2 (PScell)		channel number 1.		
					NR Cell 2 is on NR RF channel		
					number 1.		
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel		
		1,2,3,4,5,6			number 2.		
Gap Pattern Id		Config	0	4	As specified in clause 9.1.2-1.		
		1,2,3,4,5,6					
Measurement gap		Config	39	9			
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1		
A3-Offset	dB	Config	-6				
I best and also	-10	1,2,3,4,5,6	0				
Hysteresis	dB	Config	0				
CP length		1,2,3,4,5,6 Config	Normal				
3		1,2,3,4,5,6	Normal				
TimeToTrigger	S	Config	0				
		1,2,3,4,5,6					
Filter coefficient		Config	0		L3 filtering is not used		
		1,2,3,4,5,6					
DRX		Config	OFF		DRX is not used		
		1,2,3,4,5,6					
Time offset between		Config	3 μs		Synchronous EN-DC		
PCell and PSCell		1,2,3,4,5,6					
Time offset between serving and neighbour		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later		
cells					than the timing of Cell 2.		
		Config 2,3,5,6	3μs		Synchronous cells.		
]				

T1	s	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	1.1	1	

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config	1			2	
		1,2,3,4,5,6					
Duplex mode		Config 1,4	FDD				
		Config	TDD				
B)4/		2,3,5,6					
BWchannel	MHz	Config 1,4	10: N _{RB,c} = 52				
		Config 2,5	10: N _{RB,c} = 52				
DIAID DIAI	N 41 1-	Config 3,6	40: N _{RB,c} = 106				
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 52				
		Config 2,5	10: N _{RB,c} = 52 40: N _{RB,c} = 106				
TDD configuration		Config 3,6	TDDC	Conf.1.1			
TDD configuration		Config 2,5	TDDCC) . .			
		Config 3,6	TDDC	onf.2.1	TDD	Conf.2.1	
Initial DL BWP		Config 1,2,3,4,5,6	DLBW	DLBWP.0.1		NA	
Initial UL BWP		Config	ULBW	/P 0 1		NA	
Initial OE BVVI		1,2,3,4,5,6	OLDVV	1 .0.1		INA	
Dedicated DL BWP		Config	DLBW	/D 1 1		NA	
Dedicated DL BWF		1,2,3,4,5,6	DLDVV	r.I.I		INA	
Dedicated UL BWP		Config	ULBW	/P.1.1		NA	
		1,2,3,4,5,6					
TRS configuration		Config 1,4	TRS.1.			NA	
		Config 2,5	TRS.1.	1 TDD		NA	
		Config 3,6	TRS.1.	2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1		OP.1		
PDSCH Reference		Config 1,4	SR.1.1	LEDD		-	
measurement channel		Config 2,5	SR.1.1		-		
		Config 3,6	SR2.1		-		
CORESET Reference		Config 1,4	CR.1.1				
Channel		Config 2,5	CR.1.		†		
		Config 3,6	CR2.1		1		
SMTC configuration defined in A.3.11		Config 1,4	SMT		SI	MTC.5	
		Config 2,3,5,6	SMT	C.1	SI	MTC.4	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15				
		Config 3,6			30		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS		Config	0		0		
EPRE ratio of PBCH to PBCH DMRS		1,2,3,4,5,6					

	1						
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to							
PDCCH DMRS							
EPRE ratio of PDSCH DMRS							
to SSS							
EPRE ratio of PDSCH to							
PDSCH							
EPRE ratio of OCNG DMRS							
to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
Note2	dBm/15		-9	98	-98		
	kHz						
Note2	dBm/S	Config	-6	98	-98		
oc	CS	1,2,4,5					
		Config 3,6	-6	95	-95		
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91	
	CS	1,2,4,5					
		Config 3,6	-91	-91	-Infinity	-88	
Ê s /I ot	dB	Config	4	4	-Infinity	7	
		1,2,3,4,5,6					
\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7	
		1,2,3,4,5,6					
Io ^{Note3}	dBm/9.	Config	-64.59	-64.59	-70.05	-62.26	
	36MHz	1,2,4,5					
	dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15	
	.16MHz						
Propagation Condition		Config	AWGN				
		1,2,3,4,5,6					
Note 1: OCNG shall be used	such that b	oth cells are ful	ly allocated a	and a consta	nt total transr	nitted power	

- spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.6 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

A.4.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.6.1-1, A.4.6.2.6.1-2, and A.4.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target NR cell3	e 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Value		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config			1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequencies is used.
NR RF Channel		Config	1, 2				Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE C	E Cell 1 (PCell) and NR		l NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (PScell)			channel number 1.	
			, ,			NR Cell 2 is on NR RF channel	
							number 1.
Neighbour cell		Config	NR ce	II 3		-	NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.

Gap Pattern Id		Config 1,2,3,4,5,6	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39		9		
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3,4,5,6	-6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
CP length		Config 1,2,3,4,5,6	Norma	al			
TimeToTrigger	S	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.3	13.5	1.3	13.5	

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	Cell 2		Gell 3		
		configuratio	T1	T2	T1	T2		
		n						
NR RF Channel Number		Config		1		2		
		1,2,3,4,5,6						
Duplex mode		Config 1,4			FDD			
		Config		-	TDD			
		2,3,5,6						
BW _{channel}	MHz	Config 1,4		10: N	$I_{RB,c} = 52$			
		Config 2,5		10: N	$I_{RB,c} = 52$			
		Config 3,6		40: N	_{RB,c} = 106	c = 106		
BWP BW	MHz	Config 1,4		10: N	$I_{RB,c} = 52$			
		Config 2,5		10: N	$I_{RB,c} = 52$			
		Config 3,6		40: N	RB,c = 106			
OCNG Patterns defined in		Config						
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	0	P.1		OP.1		
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-		
measurement channel		Config 2,5	SR.1.	SR.1.1 TDD				
		Config 3,6	SR2.	1 TDD	1			
CORESET Reference		Config 1,4	CR.1.	1 FDD		-		
Channel		Config 2,5	CR.1.	1 TDD	1			

		Config 3,6	CR2 f	1 TDD		
TDD configuration		Config 2,5	ONZ.		Conf.1.1	
		Coning 2,5		TO 5	010-1	
		Config 3,6	TDDConf.2.1			
Initial DL BWP		Config	DLBWP.0.1			
TDC coefiningtion		1,2,3,4,5,6		TDC	4.4.EDD	
TRS configuration		Config 1,4 Config 2,5			1.1 FDD 1.1 TDD	
		Config 3,6			1.2 TDD	
Initial UL BWP		Config		ULB	WP.0.1	
Dadiastad DL DWD		1,2,3,4,5,6		DLD	WDAA	
Dedicated DL BWP		Config 1,2,3,4,5,6		DLB	WP.1.1	
Dedicated UL BWP		Config 1,2,3,4,5,6		ULB	WP.1.1	
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SM	ITC.5
		Config 2,3,5,6	SM	TC.1	SM	ITC.4
PDSCH/PDCCH subcarrier	kHz	Config			15	
spacing		1,2,4,5 Config 3,6	30			
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS						
to SSS EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	0 0			0
EPRE ratio of PDSCH DMRS to SSS		1,2,0,4,0,0				
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{ m Note2}$	dBm/15 kHz			98	-	98
N_{oc} Note2	dBm/S	Config	-6	98	-	98
	CS	1,2,4,5 Config 3,6	_0	95	_	95
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91
	CS	1,2,4,5 Config 3,6	-01	-01	-Infinity	_00
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$	dB	Config 3,6	-91 4	-91 4	-Infinity -Infinity	-88 7
		1,2,3,4,5,6				
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3,4,5,6	AWGN			

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be
	fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.7 Void

A.4.6.2.8 Void

A.4.6.3 Void

A.4.6.4 L1-RSRP measurement for beam reporting

A.4.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.4.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.1.1-1.

Table A.4.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

A.4.6.4.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.1.2-1 and Table A.4.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: NRB,c = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
CHAINE	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
Chamer	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Chamer	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1

OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1
Initial BVVF Configuration	1~0		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1
	11-0		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD
DRX configuration	1~6		Off
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~6	dB	0
EPRE ratio of PDSCH DMRS to		42	Ü
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}	4		
EPRE ratio of OCNG to OCNG			
DMRS Note 1	1.0		ANAZONI
Propagation condition	1~6	f. II II	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Config Unit		B#0	SSB#1			
Parameter	Coming	Onit	T1	T2	T1	T2		
$N_{oc}^{ m Note2}$	1~6	dBm/15kHz	-94.65					
N Note2	1,2,4,5	dBm/SSB SCS	-94.65					
TV _{oc} ······	3,6	UBIII/33B 3C3	-91.65					
$\hat{\mathbf{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$	1~6	dB	0	0	-Infinity	3		
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65		
OOD NON	3,6	dBiii/OOB OOO	-91.65	-91.65	-Infinity	-88.65		
lo ^{Note3}	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93		
	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84		

\hat{E}_s/N_{oc}	2	1~6	dB	0	0	-Infinity	3		
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period									
Note 2:	T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be								
11010 2.			s and time and shall be m						
	N_{oc} to be fulfilled.								
Note 3:			nave been derived from ot rameters themselves.	her parame	eters for inf	ormation p	urposes.		

A.4.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.4.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.2.1-1.

Config

Description

1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations

Table A.4.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

A.4.6.4.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.2.2-1 and Table A.4.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BWchannel	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Charmer	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5]	CR.1.1 TDD
Charmer	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Chambi	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1
Initial BVVI Cornigaration	1~0		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1
			ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD

DRX configuration	1~6		DRX.3				
reportConfigType	1~6		periodic				
reportQuantity	1~6		ssb-Index-RSRP				
Number of reported RS	1~6		2				
L1-RSRP reporting period	1~6	slot	80				
T1	1~6	S	5				
T2	1~6	S	1				
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH							
DMRS							
EPRE ratio of PDCCH DMRS to							
SSS							
EPRE ratio of PDCCH to PDCCH							
DMRS	1~6	dB	0				
EPRE ratio of PDSCH DMRS to	1~0	uБ	U				
SSS							
EPRE ratio of PDSCH to PDSCH							
DMRS							
EPRE ratio of OCNG DMRS to							
SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG							
DMRS Note 1							
Propagation condition	1~6		AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant							

ote 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSB#1	
Parameter	Config	Unit	T1 T2 T1		T2	
$N_{_{OC}}$ Note2	1~6	dBm/15kHz	-94.65			
N Note2	1,2,4,5	dDm/CCD CCC		-94	.65	
$N_{oc}^{}$ Note2	3,6	0BIII/33B 3C3	m/SSB SCS -91.65		.65	
$\hat{ extsf{E}}_{ extsf{s}}/ extsf{I}_{ ext{ot}}$	1~6	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
OOD NON	3,6	GBIT/00B 000	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2,4,5	dBm/9.36 MHz			-66.70	-61.93
10	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{oc}	1~6	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.4.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.3.1-1.

Config

Description

1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations

Table A.4.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

A.4.6.4.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.3.2-1 and Table A.4.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
1	3,6		TDD
TDD Configuration	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1

Table A.4.6.4.3.2-1: General test parameters

	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6	-	40: N _{RB,c} = 106
DD00LLD (1,4		SR.1.1 FDD
PDSCH Reference measurement	2,5		SR.1.1 TDD
channel	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
Dadiated CORECET Defenses	1,4		CCR.1.1 FDD
Dedicated CORESET Reference	2,5	1	CCR.1.1 TDD
Channel	3,6	1	CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5	1	SSB.3 FR1
C	3,6	1	SSB.4 FR1
	1,4		CSI-RS 1.3 FDD
CSI-RS configuration	2,5	1	CSI-RS 1.3 TDD
3	3,6	1	CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
garaman	3,6		TRS.1.2 TDD
			DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dedicated DWD and sweeting	4.0		DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		Off
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
•	4.6		SSB#0 for resource#0
qcl-Info	1~6		SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	26
T1	1~6	s	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1	-		
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such the	_	are fully all	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

CSI-RS#0 CSI-RS#1 **Parameter** Config Unit $N_{oc}^{
m Note1}$ 1~6 dBm/15kHz -94.65 1.2.4.5 -94.65 N_{oc} Note1 dBm/SSB SCS -91.65 3,6 \hat{E}_{s}/I_{ot} 1~6 dB 3 0 1,2,4,5 **CSI-RS RSRP** -94.65 -91.65 dBm/SSB SCS Note2 3,6 -91.65 -88.65 1,2,4,5 dBm/9.36 MHz -63.69 -61.93 lo Note2 3,6 dBm/38.16 MHz -57.59 -55.84 \hat{E}_{s}/N_{oc} 1~6 dВ

Table A.4.6.4.3.2-2: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.4.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.4.1-1.

Table A.4.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

A.4.6.4.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.4.2-1 and Table A.4.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Chamb	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
	1,4		CSI-RS 1.3 FDD
CSI-RS configuration	2,5		CSI-RS 1.3 TDD
	3,6		CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		DRX.3
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
qcl-Info	1~6		SSB#0 for resource#0
-	1.6	oloto	SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	26
T1	1~6	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	4		
	4		
EPRE ratio of PBCH to PBCH DMRS	_		
EPRE ratio of PDCCH DMRS to SSS	_		
EPRE ratio of PDCCH to PDCCH			
DMRS	1.6	4D	
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS	4		
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~6		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
N_{oc} Note1	1~6	dBm/15kHz	-94	.65		
Ŋ Note1	1,2,4,5	dD/CCD CCC	-94.65			
$N_{oc}^{ m Note1}$	V _{oc} Note1 dBm/SSB SCS		-91.65			
\hat{E}_{s}/I_{ot}	1~6	dB	0	3		
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65		
Note2	3,6	dbiii/oob ooo	-91.65	-88.65		
lo Note2	1,2,4,5 dBm/9.36 MHz				-63.69	-61.93
10 110102	3,6	dBm/38.16 MHz	-57.59	-55.84		
\hat{E}_s/N_{oc}	1~6	dB	0	3		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.7 Measurement Performance requirements

A.4.7.1 SS-RSRP

A.4.7.1.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.4.7.1.1.2 Test parameters

In this set of test cases all NR cells are on the same carrier frequency. Supported test configurations are shown in table A.4.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.1.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1 In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations for each supported band					

Table A.4.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		1124	Te	est 1	Te	st 2	Test 3			
		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3		
Physical cell ID			489	489 0 489 0			489	0		
SSB ARFCN			fr	eq1	fre		fre	freq1		
Duplex mode	Config 1,4			FDD						
Bupiex mode	Config 2,3,5,6				TD					
	Config 1,4		Not Applicable							
TDD configuration	Config 2,5		TDDConf.1.1							
	Config 3,6				TDDCc					
	Config 1,4				10: N _{RB}					
BW _{channel}	Config 2,5	MHz			10: N _{RB}					
D. C. C. C. C. C. C. C. C. C. C. C. C. C.	Config 3,6				40: N _{RB,}					
Downlink initial BWP con					DLBW					
Downlink dedicated BWF					DLBW					
Uplink initial BWP configue Uplink dedicated BWP configue Configue			+		ULBW ULBW					
Opilitik dedicated BWP CC	Tillguration		TRS.1.	I	TRS.1.1	F.I.I	TRS.1.			
	Config 1,4		1 FDD	NA	FDD	NA	1 FDD	NA		
TRS configuration	Config 2,5		TRS.1. 1 TDD	NA	TRS.1.1 TDD	NA	TRS.1. 1 TDD	NA		
	Config 3,6		TRS.1. 2 TDD	NA	TRS.1.2 TDD	NA	TRS.1. 2 TDD	NA		
DRX Cycle		ms			Not App	licable				
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-		
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD			
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD			
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-		
	Config 3,6		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD			
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD			
Control Channel RMC	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	_		
	Config 3,6		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD			
SSB configuration	Config 1,4		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1		

		Config 2,5		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	
		Config 3,6		FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	
		Config 1,4	ms	FR1	FR1	FR1	FR1	FR1	FR1	
Time offset	with Cell 2	Config 2,3,5,6	us	_	3	_	3	_	3	
		Config 1,4	μο		3	SMT				
SMTC confi	guration	Config 2,3,5,6				SMT	C.1			
OCNG Patte	erns					OP	.1			
PDSCH/PD		Config 1,2,4,5	kHz			15 k				
subcarrier s		Config 3,6	N. I.Z		T	30k	Hz			
	of PSS to SSS of PBCH DMR:	C to CCC	-							
	of PBCH to PB									
	of PDCCH DM									
	of PDCCH to F		dB	0	0	0	0	0	0	
	of PDSCH DM									
	of PDSCH to P									
		S to SSS(Note 1)								
EPRE ratio	of OCNG to O	CNG DMRS (Note 1)					<u> </u>			
		NR_FDD_FR1_A, NR_TDD_FR1_A								
		NR_TDD_FRT_A						_1	14	
	NR_FDD_FR1_B							3.5		
	0	NR_TDD_FR1_C						-1		
	Config 1,2,4,5	NR_FDD_FR1_D,	1	-1	106	-8	38			
	1,2,4,5	NR_TDD_FR1_D	dBm/15KhZ					-112.5		
		NR_FDD_FR1_E,						110		
		NR_TDD_FR1_E NR_FDD_FR1_G						-112 -111		
3.7		NR FDD FR1 H						-110.5		
Note2		NR FDD FR1 A,						-,,	0.0	
		NR_TDD_FR1_A		Not applicable ^{Note 5}						
		NOTE 6				-94		-114		
		NR_FDD_FR1_B						-113.5		
	0	NR_TDD_FR1_C						-113		
	Config 3,6	NR_FDD_FR1_D, NR_TDD_FR1_D						-112.5		
		NR_FDD_FR1_E,							2.0	
		NR_TDD_FR1_E						-112		
		NR_FDD_FR1_G						-1		
		NR_FDD_FR1_H						-110.5		
	Config 1,2,4,	5		-1	106	-8	38		e as 5kHz	
		NR_FDD_FR1_A,	1					-1		
		NR_TDD_FR1_A NOTE								
		6							0.5	
Note2		NR_FDD_FR1_B		dBm/SCS					-11	0.5 10
$N_{oc}^{ m Note2}$	Config 3,6	NR_FDD_FR1_D,	ubili/303	Not anni	icable ^{Note 5}	_0	91		9.5	
	30ing 0,0	NR_TDD_FR1_D		l appi					0.0	
		NR_FDD_FR1_E,	1					-1	09	
		NR_TDD_FR1_E								
	NR_FDD_FR1_G		-					-1 -10		
NR_FDD_FR1_H							-0.01	-4.76		
${ m \hat{E}}_{\scriptscriptstyle m s}/{ m I}_{\scriptscriptstyle m ot}$		dB	2.46	-5.97	2.46	-5.97	-0.01	4.70		
\hat{E}_s/N_{oc}			dB	6	1	6	1	3	0	
		NR_FDD_FR1_A,						-111.00	-114.00	
		NR_TDD_FR1_A								
SS-	Config		dD/000	100	405	00	0.7	110.50	110.50	
RSRP ^{Note3}	1,2,4,5	NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SCS	-100	-105	-82	-87	-110.50 -110.00	-113.50 -113.00	
		NR_FDD_FR1_D,						-109.50	-112.50	
		NR_TDD_FR1_D								

		NR_FDD_FR1_E,						-109.00	-112.00
		NR_TDD_FR1_E NR_FDD_FR1_G	-					-108.00	-111.00
		NR_FDD_FR1_H						-107.50	-110.50
		NR_FDD_FR1_A,	1					-108.00	-111.00
		NR_TDD_FR1_A						100.00	111.00
		NOTE 6							
		NR_FDD_FR1_B						-107.50	-110.50
		NR_TDD_FR1_C		- Not	Not			-107.00	-110.00
	Config 3,6	NR_FDD_FR1_D,		applicab le ^{Note 5}	applicabl e ^{Note 5}	-85	-90	-106.50	-109.50
		NR_TDD_FR1_D	-	le ^{Note 5}	e ^{Note 5}			400.00	400.00
		NR_FDD_FR1_E, NR_TDD_FR1_E						-106.00	-109.00
		NR_FDD_FR1_G						-105.00	-108.00
		NR FDD FR1 H	1					-104.50	-107.50
		NR_FDD_FR1_A,							.03
		NR_TDD_FR1_A							
		NOTE 6	dBm/						
		NR_FDD_FR1_B		-70.09		-52.09		-79.53	
	Config	NR_TDD_FR1_C						-79.03	
	1,2,4,5	NR_FDD_FR1_D,	9.36MHz					-78	5.53
	,,,,,,,	NR_TDD_FR1_D						70	. 00
		NR_FDD_FR1_E, NR_TDD_FR1_E						-/8	3.03
		NR_FDD_FR1_G	1					-77	.03
		NR_FDD_FR1_H							5.53
Io ^{Note3}		NR FDD FR1 A,							.94
		NR_TDD_FR1_A						''	
		NOTE 6							
		NR_FDD_FR1_B						-73	.44
		NR_TDD_FR1_C	dBm/					-72	.94
	Config 3,6	NR_FDD_FR1_D,	38.16MHz	Not appl	icable ^{Note 5}	-51	.99	-72	.44
		NR_TDD_FR1_D	00.101/11/12						
		NR_FDD_FR1_E,						-71	.94
		NR_TDD_FR1_E	-					70	. 0.4
		NR_FDD_FR1_G	-).94).44
Dropogotica	oondition	NR_FDD_FR1_H	_			AW	CN	-70	1.44
	Propagation condition Antenna configuration					1x			
		oe used such that both	rells are fully	allocated	and a cons			d nower si	nectral
		nieved for all OFDM sy		anocateu	ana a 00113	an total	an ionnitte	a power a	Joonai
l	donoity is doi	ilovou ioi ali oi bivi sy							

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.4.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.4.7.1.2 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations in Table A.4.7.1.2.1-1.

Table A.4.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is onl	y required to be tested in one of the supported test configurations on each supported band

A.4.7.1.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.4.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Danamatan	0	11	Test	1	Tes	t 2
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N _{RB,0}	= 52	10: N _{RB}	,c = 52
BW _{channel}	2,5	MHz	10: N _{RB,0}	= 52	10: N _{RB,c} = 52	
	3,6		40: N _{RB,c}	40: N _{RB,c} = 106		= 106
Gap pattern ID			0		0	
	1,4		FDI)	FD	D
Duplex mode	2,5		TDI)	TD	D
	3,6		TDI)	TD	D
	1,4		N/A	١	N/A	
TDD configuration	2,5		TDDConf.1.1		TDDCo	nf.1.1
	3,6		TDDCor	nf.2.1	TDDCo	nf.2.1
	1,4		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
	3,6		SR.2.1 FDD		SR.2.1 FDD	
	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-

		0.0		00004700		CCR.2.1	
		3,6		CCR.2.1 TDD	-	TDD	-
		1,4	ļ	SSB.1		SSB.1	
SSB config	uration	2,5	-	SSB.1		SSB.1	
OCNO D-H		3,6		SSB.2		SSB.2 FR1	
OCNG Patt	erns	1~6 1,4		OP.		OP.1 TRS.1.1 FDD	
TRS config	uration	2,5	}	TRS.1.1 FDD TRS.1.1 TDD -		TRS.1.1 TD	
TIXO COINING	uration	3,6		TRS.1.1 TDE		TRS.1.1 TD	
				DLBWF		DLBW	
Initial BWP	Configuration	1~6		ULBWF		ULBW	
D !! (!!	DIMD (' ('	4.0		DLBWF		DLBW	
Dedicated I	BWP configuration	1~6		ULBWF	P.1.1	ULBW	P.1.1
SMTC conf	iguration	1~6		SMT	C.1	SMT	C.1
Time offset	between Cell 2	4.0					
and Cell 3		1~6	μs	3		3	
EPRE ratio o	of PSS to SSS						
	of PBCH DMRS to						
SSS	(DDOLL (DDOLL						
DMRS	of PBCH to PBCH						
	of PDCCH DMRS to						
SSS							
	of PDCCH to PDCCH	4.0	40	0	0	0	
DMRS	of DDCCH DMDC to	1~6	dB	0	0	0	0
SSS	EPRE ratio of PDSCH DMRS to SSS						
	EPRE ratio of PDSCH to PDSCH						
DMRS							
EPRE ratio of SSS ^{Note 1}	of OCNG DMRS to						
	of OCNG to OCNG						
DMRS Note 1							
	NR_FDD_FR1_A, NR_TDD_FR1_A						-115
	NOTE 5						
	,						
Note2	NR_FDD_FR1_B					(N = 5	-114.5
Note2	NR_TDD_FR1_C	1~6	dBm/15	-94.65		$(N_{oc} \text{ for }$	-114
	NR_FDD_FR1_D, NR_TDD_FR1_D		kHz			Cell 3 +8dB)	-113.5
	NR_FDD_FR1_E,					+odb)	-113
	NR_TDD_FR1_E						4.40
	NR_FDD_FR1_G						-112
	NR_FDD_FR1_H NR_FDD_FR1_A,					1	-111.5 -115
	NR_TDD_FR1_A						-115
	NOTE 5,						
	NR FDD ED1 P						-114.5
	NR_FDD_FR1_B NR_TDD_FR1_C			-94.6	35	(N_{oc}) for	-114.5
	NR_FDD_FR1_D,	1,2,4,5		-94.0	,,,	Cell 3	-113.5
	NR_TDD_FR1_D					+8dB)	
l	NR_FDD_FR1_E,						-113
N_{oc} Note2	NR_TDD_FR1_E NR_FDD_FR1_G		dBm/SS				-112
	NR_FDD_FR1_H		B SCS				-111.5
	NR_FDD_FR1_A,		1			1	-112.00
NR_TDD_FR1_A							
	NR_FDD_FR1_B						-112.50
	NR_TDD_FR1_C	3,6		-91.6	S5	$(N_{oc} \text{ for})$	-112.00
	NR_FDD_FR1_D,	-,-				C 3 +8dB)	-111.50
	NR_TDD_FR1_D						
	NR_FDD_FR1_E, NR_TDD_FR1_E						-111.00
		1	1	1		1	

	ND EDD ED4 C					1	110.00
	NR_FDD_FR1_G						-110.00 -110.50
	NR_FDD_FR1_H						
	$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	1~6	dB	10	10	13	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5, NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	1,2,4,5		-84.65		(RSRP for Cell 3 +25dB)	-118.00 -117.50 -117.00 -116.50 -116.00 -115.00 -114.50
SS- RSRPNote3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE5, NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G	3,6 -81.65 (RSRP for Cell 3 +25dB)	-114.50 -114.00 -113.50 -112.00 -111.50				
Io ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE6, NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	1,2,4,5	dBm/ 9.36MH z	9.36MH -56.28		(Io for Channel 3 +19.75dB)	-85.28 -84.78 -84.28 -83.78 -83.28 -82.28 -81.78
10	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE6, NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3,6	dBm/ 38.16M Hz	-50.1	9	(Io for Channel 3 +19.75dB)	-79.19 -78.69 -78.19 -77.69 -76.19 -75.69

	\hat{E}_s/N_{oc}	1~6	dB	10	10	13	-3
Prop	Propagation condition 1~6 - AWGN AW			AWO	ΞN		
Ante	nna configuration			1x2	<u>)</u>	1x2	2
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.							
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power						
Note 3:	for $\frac{N_{oc}}{oc}$ to be fulfilled. Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 4: RSRP minimum requirements are specified assuming independent interference and no at each receiver antenna port. Note 5 The test configuration excludes support for band n51 and it is not required to run this te							

A.4.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.1.1 and Relative requirement in clause 10.1.4.1.2.

on band n51 in this release of the specification

A.4.7.1.3 Void

A.4.7.2 SS-RSRQ

A.4.7.2.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.4.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.4.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

			To	st 1	Too	st 2	Tes	et 3	
Para	meter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN				eq1	fre		fre		
	Config 1,4		110	791		DD	110	Υ'	
Duplex mode	Config 2,3,5,6					DD D			
	Config 1,4								
TDD configuration	Config 2,5		Not Applicable TDDConf.1.1						
1 DD cornigatation	Config 3,6		TDDConf.1.1 TDDConf.2.1						
	Config 1,4					$B_{,c} = 52$			
BW _{channel}	Config 2,5	MHz				B,c = 52 B,c = 52			
DVVChanner	Config 3,6	IVII 12				$B_{,c} = 32$ $B_{,c} = 106$			
	Initial DL BWP					VP.0.1			
	Dedicated DL								
	BWP				DLBV	VP.1.1			
BWP configuration	Initial UL BWP				III BV	VP.0.1			
	Dedicated UL								
	BWP		ULBWP.1.1						
DRX Cycle	1 - · · ·	ms			Not An	plicable			
	Confin 4 4		SR.1.1		SR.1.1		SR.1.1		
PDSCH Reference	Config 1,4		FDD		FDD		FDD		
measurement	Config 2,5	1	SR.1.1	_	SR.1.1	1 _	SR.1.1	_	
channel	Corning 2,5		TDD		TDD		TDD	_	
Chamic	Config 3,6		SR2.1		SR2.1		SR2.1		
			TDD CR.1.1		TDD CR.1.1		TDD CR.1.1		
	Config 1,4		FDD		FDD		FDD		
RMSI CORESET	0 " 0 "		CR.1.1		CR.1.1		CR.1.1		
Reference Channel	Config 2,5		TDD	-	TDD	-	TDD		
	Config 3,6		CR.2.1		CR.2.1		CR.2.1		
	Corning 5,0		TDD		TDD		TDD		
	Config 1,4		CCR.1.		CCR.1.		CCR.1.		
Control Channel			1 FDD CCR.1.		1 FDD CCR.1.		1 FDD CCR.1.		
RMC	Config 2,5		1 TDD	-	1 TDD	-	1 TDD	-	
TUVIO	0 " 00		CCR.2.		CCR.2.		CCR.2.		
	Config 3,6		1 TDD		1 TDD		1 TDD		
OCNG Patterns					OF	P. 1			
SS-RSSI-Measurem	ent					plicable			
STMC configruation						TC.1			
SSB configuration	Config 1,2,4,5					1 FR1			
	Config 3,6					2 FR1			
PDSCH/PDCCH	Config 1,2,4,5	kHz				kHz			
subcarrier spacing	Config 3,6	IXI IZ			301	kHz			
EPRE ratio of PSS to S									
EPRE ratio of PBCH D									
EPRE ratio of PBCH to									
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0	0	0	
EPRE ratio of PDSCH DMRS to SSS		QD.						3	
EPRE ratio of PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
	NR_FDD_FR1_A,								
$N_{\!oc}$ Config	NR_TDD_FR1_A	dBm/15k					-1	14	
1015	NOTE 7	Hz		85	-1	01			
Note2 1,2,4,5	NR_FDD_FR1_B							-113.5	
	NR_TDD_FR1_C						-1	13	

	ı	ND EDD ED4 D				1			
		NR_FDD_FR1_D, NR_TDD_FR1_D						-11	2.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12
		NR_FDD_FR1_G						-1 ⁻	11
		NR_FDD_FR1_H						-11	
		NR_FDD_FR1_A,							
		NR_TDD_FR1_A NOTE 7						-11	14
		NR_FDD_FR1_B						-11	3.5
	Config	NR_TDD_FR1_C						-1 ⁻	13
	3,6	NR_FDD_FR1_D,		-(91	,	-	-11	2.5
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-1 ⁻	12
		NR_FDD_FR1_G						-1	11
		NR_FDD_FR1_H						-11	0.5
		NR_FDD_FR1_A,							
		NR_TDD_FR1_A NOTE 7						-1 ⁻	14
		NR_FDD_FR1_B						-113.5	
	Config	NR_TDD_FR1_C						-113	
	1,2,4,5	NR_FDD_FR1_D,		-8	35	-101		-112.5	
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-1 ⁻	12
		NR_FDD_FR1_G						-1	11
N_{oc}		NR_FDD_FR1_H	dBm/SC					-11	0.5
Note2		NR_FDD_FR1_A, NR_TDD_FR1_A	, s	-88		_		-111	
		NOTE 7						-110.5	
		NR_FDD_FR1_B NR_TDD_FR1_C						-110.5	
	Config	NR_FDD_FR1_D,							
	3,6	NR_TDD_FR1_D						-109.5	
		NR_FDD_FR1_E,						-11	na
		NR_TDD_FR1_E						-109	
		NR_FDD_FR1_G						-108	
^ /		NR_FDD_FR1_H						-10	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$			dB		.76		.7	-5.46	-5.46
\hat{E}_s/N_o	ос	<u>, </u>	dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
	0 "	NR_TDD_FR1_C						-117	-117
SS-	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/SC	-82	-82	-103.9	-103.9	-116.5	-116.5
RSRP Note3		NR_FDD_FR1_E,	dBm/SC S					-116	-116
		NR_TDD_FR1_E NR_FDD_FR1_G						-115	-115
		NR_FDD_FR1_H						-114.5	-114.5
	Config 3,6	NR_FDD_FR1_A, NR_TDD_FR1_A		-85	-85	-	-	-115	-115
	3,0	NOTE 7							

NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,					-114.5	
				-114	-114	
				-113.5	-113.5	
NR_TDD_FR1_D				110.0	110.0	
NR_FDD_FR1_E,				-113	-113	
NR_TDD_FR1_E NR_FDD_FR1_G				-112	-112	
NR_FDD_FR1_H				-111.5	-111.5	
NR_FDD_FR1_A,				111.0	111.0	
NR_TDD_FR1_A						
NR_FDD_FR1_B						
NR_TDD_FR1_C						
SS-RSRQ Note3 NR_FDD_FR1_D, dB -14.7	7 -14.77	-16.76	-16.76	-17.34	-17.34	
NR_TDD_FR1_D						
NR_FDD_FR1_E,						
NR_TDD_FR1_E						
NR_FDD_FR1_G						
NR_FDD_FR1_H NR_FDD_FR1_A,						
NR TDD FR1 A				-83	3.5	
NOTE 7						
NR_FDD_FR1_B					33	
Config NR_TDD_FR1_C dBm/		-70		-82.5		
1 2 4 5 NR_FDD_FR1_D, 9 36MHz	-50			-82		
NR_TDD_FR1_D 0.56Wii i 2 NR_FDD_FR1_E,						
NR_TDD_FR1_E				-8	-81.5	
NR_FDD_FR1_G				-80).5	
lo ^{Note3} NR_FDD_FR1_H				-8	30	
NR_FDD_FR1_A,						
NR_TDD_FR1_A NOTE 7				-77	7.4	
NR_FDD_FR1_B				-76	6.9	
Config NR_TDD_FR1_C dBm/				-76	6.4	
	-50		-	-7!	5.9	
NR_TDD_FRT_D HZ				, ,	7.0	
NR_FDD_FR1_E,				-75	5.4	
NR_TDD_FR1_E NR_FDD_FR1_G				_7/	1.4	
NR_FDD_FR1_H				-72		
Propagation condition - AWG	N AWGN	AWGN	AWGN	AWGN	AWGN	
Antenna configuration 1x2	1x2	1x2	1x2	1x2	1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: Subtest 2 is not used when testing with 30kHz SSB SCS.
- Note 7: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.4.7.2.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter frequency measurement.

A.4.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.2.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note: The UE is only							

Table A.4.7.2.2.2: SS-RSRQ Inter frequency test parameters

Parame	otor	Unit	Tes	Test 1		Test 2		Test 3	
Parame	eter	Offic	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode	Config 1,4		FDD						
Duplex mode	Config 2,3,5,6		TDD						
	Config 1,4	1			Not App	licable			
TDD configuration	Config 2,5		TDDConf.1.1						
	Config 3,6				TDDCo	nf.2.1			
	Config 1,4		10: N _{RB,c} = 52						
BWchannel	Config 2,5	MHz	10: N _{RB,c} = 52						
	Config 3,6		40: N _{RB,c} = 106						
	Config 1,4		10: N _{RB,c} = 52						
BWP BW	Config 2,5	MHz	10: N _{RB,c} = 52						
	Config 3,6		40: N _{RB,c} = 106						
DRX Cycle		ms			Not App	licable			
PDSCH Reference	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
measurement channel	Config 2,5		SR.1.1 TDD	_	SR.1.1 TDD	-	SR.1.1 TDD	-	

			1		1	ı	1		
		Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
		Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
RMSI COI Reference	_	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-
		Config 3,6	1	CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
		Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1 .1 FDD	
Dedicated Reference	CORESET Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1 .1 TDD	-
		Config 3,6	1	CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2 .1 TDD	
OCNG Pa	OCNG Patterns				I.	OCNG pa	attern 1	I	I
	SMTC configuration Config 1,2,4,5					SMTC pa			
SMTC configuration Config 3,6					SMTC pa				
SSR conf	SSB configuration Config 1,2,4,5					SSB patteri	n 1 in FR1		
335 (011	Config 3,6				5	SSB patteri	n 2 in FR1		
	PDSCH/PDCCH Config 1,2,4,5		kHz			15 k	Hz		
subcarrier spacing Config 3,6		KIIZ			30 k	Hz			
	EPRE ratio of PSS to SSS								
	of PBCH DMR								
FPRE ratio	of PBCH to PB of PDCCH DM	RS to SSS							
EPRE ratio	of PDCCH to F	DCCH DMRS	dB	0	0	0	0	0	0
	of PDSCH DM								
	of PDSCH to P	S to SSS(Note 1)							
		CNG DMRS (Note 1)							
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-116	-116
		NR_FDD_FR1_B NR_TDD_FR1_C						-115.5 -115	-115.5 -115
	Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/15kHz	-80.18	-80.18	-106	-106	-114.5	-114.5
		NR_FDD_FR1_E							
		NR_TDD_FR1_E NR_FDD_FR1_G	1					-114 -113	-114 -113
$N_{oc}^{ m Note2}$		NR_FDD_FR1_H	_					-112.5	-112.5
IV _{oc}		NR_FDD_FR1_A							
		NR_TDD_FR1_A NR_SDL_FR1_A						-116	-116
		NR_FDD_FR1_B	_					-115.5	-115.5
		NR_TDD_FR1_C	I					-115	-115
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/15kHz	-86.27	-86.27	-113	-113	-114.5	-114.5
		NR_FDD_FR1_E						444	444
		NR_TDD_FR1_E NR_FDD_FR1_G						-114 -113	-114 -113
		NR_FDD_FR1_H	1					-112.5	-112.5
		NR_FDD_FR1_A							-
		NR_TDD_FR1_A NR_SDL_FR1_A				3 -106		-116	-116
Note2	Config	NR_FDD_FR1_B	1	00.40	00.40		-106	-115.5	-115.5
$N_{oc}^{ m Note2}$	1,2,4,5	NR_TDD_FR1_C	dBm/SCS	-80.18	-80.18			-115	-115
		NR_FDD_FR1_D NR_TDD_FR1_D						-114.5	-114.5
		NR_FDD_FR1_E						-114	-114

	ı	ND TDD FD4 F					ı		
		NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						-113 -112.5	-113 -112.5
		NR_FDD_FR1_A NR_TDD_FR1_A	-					-112.5	-112.5
		NR_SDL_FR1_A						-113	-113
		NR_FDD_FR1_B NR_TDD_FR1_C						-112.5 -112	-112.5 -112
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-83.27	-83.27	-110	-110	-111.5	-111.5
		NR_FDD_FR1_E NR_TDD_FR1_E						-111 -110	-111 -110
		NR_FDD_FR1_G NR_FDD_FR1_H						-109.5	-109.5
Ê , /I ot			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
\hat{E}_{s}/N_{oc}			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-113	- 117.75
		NR_FDD_FR1_B						-112.5	- 117.25
	Config	NR_TDD_FR1_C	•					-112	- 116.75
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D		-81.93	-81.93	-107.75	-107.75	-111.5	- 116.25
		NR_FDD_FR1_E NR_TDD_FR1_E	dBm/SCS					-111	- 115.75
		NR_FDD_FR1_G						-110	- 114.75
SS-		NR_FDD_FR1_H						-109.5	- 114.25
RSRP ^{Note3}	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A		-85.02	-85.02	-111.75	-111.75	-110	- 114.75
		NR_FDD_FR1_B						-109.5	- 114.25
		NR_TDD_FR1_C						-109	- 113.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-108.5	- 113.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.75
		NR_FDD_FR1_G						-107	- 111.75
		NR_FDD_FR1_H						-106.5	- 111.25
		NR_FDD_FR1_A NR_TDD_FR1_A							
		NR_FDD_FR1_B NR_TDD_FR1_C							
SS-RSRQ N	ote3	NR_FDD_FR1_D NR_TDD_FR1_D	dB	-14.77	-14.77	-40.59	-40.59	-12.56	-14.76
		NR_FDD_FR1_E NR_TDD_FR1_E							
		NR_FDD_FR1_G NR_FDD_FR1_H							
		NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-83.28	-85.83
		NR_FDD_FR1_B	•					-82.78	-85.33
Io ^{Note3}	Config	NR_TDD_FR1_C NR_FDD_FR1_D	dBm/ 9.36MHz	-50	-50	-75.83	-75.83	-82.28	-84.83
	1,2,4,5	NR_TDD_FR1_D NR_FDD_FR1_E	∌.JOIVI∏Z			76.60		-81.78	-84.33
		NR_TDD_FR1_E NR_FDD_FR1_G						-81.28 -80.28	-83.83 -82.83
		NR_FDD_FR1_H						-79.78	-82.83

		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-77.19	-79.73
	Config 3,6	NR_FDD_FR1_B NR_TDD_FR1_C	dBm/ 38.16MHz	-50	-50	-76.73	-76.73	-76.69 -76.19	-79.23 -78.73
		NR_FDD_FR1_D NR_TDD_FR1_D						-75.69	-78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	-77.73
		NR_FDD_FR1_G						-74.19	-76.73
		NR_FDD_FR1_H						-73.69	-76.53
Propagation condition			AWGN	AWGN	AWGN	AWGN	AWG N	AWG N	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Section 3.5.2.

A.4.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 10.1.9.1.1 and 10.1.9.1.2.

A.4.7.3 SS-SINR

A.4.7.3.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.4.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.3.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Co	nfig	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
;	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
;	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Th	he LIF is only r	equired to be tested in one of the supported test configurations

Table A.4.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parame	Unit	Te	st 1	Tes	t 2	
Parameter		Onit	Cell 2 Cell 3		Cell 2 Cell 3	
SSB ARFCN	1 -		fre	freq1 freq1		
Duplex mode	Config 1,4		FDD			
.,	Config 2,3,5,6				DD	
TDD	Config 1,4				plicable	
TDD configuration	Config 2,5	-			onf.1.1	
Downlink initial BWP cor	Config 3,6				onf.2.1 VP.0.1	
Downlink dedicated BWI					VP.0.1 VP.1.1	
Uplink initial BWP config					VP.0.1	
Uplink dedicated BWP c					VP.1.1	
DRX Cycle configuration		ms			plicable	
	Config 1, 4				.1 FDD	
TRS configuration	Config 2, 5				.1 TDD	
	Config 3, 6				.2 TDD	
	Config 1,4		SR.1.1		SR.1.1	
PDSCH Reference			FDD SR.1.1		FDD SR.1.1	
measurement channel	Config 2,5		TDD	-	TDD	-
	Config 3,6	1	SR.2.1	,	SR2.1	
	Corning 3,6		TDD		TDD	
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD	
	Config 1,4		CCR.1. 1 FDD		CCR.1.1 FDD	
Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1.1 TDD	-
Reference offamilier	Config 3,6		CCR.2. 1 TDD		CCR.2.1 TDD	
OCNG Patterns			OP.1			
SS-RSSI-Measurement			Not Applicable			
SMTC configruation			SMTC.1			
SSB configuration	Config 1,2,4,5				1 FR1	
_	Config 3,6				2 FR1	
PDSCH/PDCCH	Config 1,2,4,5	kHz			15	
subcarrier spacing	Config 3,6		30			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	2 to 222	-				
EPRE ratio of PBCH to PBC						
EPRE ratio of PDCCH DMF						
EPRE ratio of PDCCH to PI	DCCH DMRS	dB	0	0	0	0
EPRE ratio of PDSCH DMR						
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)						
	EPRE ratio of OCNG DMRS to 355(Note 1)					
LI IL IAIIO OI OCING IO OC	NR FDD FR1 A,				-1 ⁻	16
	NR_TDD_FR1_A					. 0
	NR_FDD_FR1_B				-11:	5.5
Notes	NR_TDD_FR1_C	dBm/15kH			-11	
$N_{oc}^{ m Note2}$	NR_FDD_FR1_D, NR_TDD_FR1_D	Z	-6	93	-11	4.5
	NR_FDD_FR1_E,				-1	14
	NR_TDD_FR1_E NR_FDD_FR1_G	-			4 /	12
	NR_FDD_FR1_G NR_FDD_FR1_H	1			-113 112.5	
	I NK_FDD_FKI_H				-112.5	

NR FDD FR1 A NR FDD FR1 B NR FDD FR1 C Onfig 3.6 NR FDD FR1 B NR F		Config 1,2,4	.,5		-6	93	Same as	
No. No.	Note2	3 / /	NR_FDD_FR1_A, NR_TDD_FR1_A					
Config 3.6 NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_H			NR_FDD_FR1_B				-11:	2.5
NR TDD_FR1 E NR_FDD_FR1 B NR_FDD_FR1 D NR_FDD_FR1 D NR_FDD_FR1 E NR_F	$N_{oc}^{\rm Note2}$	0 " 00		dBm/SCS			-11	12
NR_FDD_FR1_G NR_FDD_FR1_H		Config 3,6	NR_TDD_FR1_D		-{	90	-11	1.5
Bi, /I a			/				-11	11
B. I								
Red	Ê/I		NR_FDD_FR1_H	٩D	0	2 10		
Config 1,2,4,5 NR, FDD, FR1_A, NR_TDD_FR1_B, NR_TDD_FR				-				
NR TDD_FR1_B NR T	E_s/N_{oc}		ND EDD ED1 A	ав	4.54	2.66	-4	-4
Config 1,2,4,5			NR_TDD_FR1_A				-120	-120
SS-SINR Notes SS-SINR Note								
1,2,4,5 NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR		Config			-88.46	-00.34	-119	-119
NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B		_			-00.40	-30.04	-118.5	-118.5
NR_FDD_FR1_G NR_FDD_FR1_H				dBm/SCS			-118	-118
NR_FDD_FR1_H NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_F							-117	-117
NR_FDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_F								
Config 3,6 NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D		Config 3,6	NR_TDD_FR1_A		-85.46		-117	-117
Config 3,6			NR_FDD_FR1_B				-116.5	-116.5
NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_H NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B								
NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NOTE 6 NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A, NOTE 6 NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD						-87.34	-115.5	-115.5
NR_FDD_FR1_G NR_FDD_FR1_H							-115	-115
NR_FDD_FR1_H							11/	111
SS-SINR Note3 NR_FDD_FR1_A, NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FD								
SS-SINR Note3 RS-SINR Note3 NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_E NR_FDD_FR1_G -83.51								
NR_TDD_FR1_C			NOTE 6					
SS-SINR Note3 NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G								
NR_FDD_FR1_E	SS-SINR N	lote3	1	dB	0	-3.19	-5.46	-5.46
NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_F								
NR_FDD_FR1_G			/					
NR_FDD_FR1_H								
IoNote3 Config 1,2,4,5 IoNote3 NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G -83.51			NR_FDD_FR1_H					
Io ^{Note3} Config 1,2,4,5 R_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G -83.51			NR_TDD_FR1_A				-85	.51
Io ^{Note3} Config 1,2,4,5 NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G -83.51			NR_FDD_FR1_B				-85	.01
1,2,4,5 NR_FDD_FR1_D, 9.36MHz 9.36MHz -57.5 -84.01 -83.51	I Note2	Confia		dBm/		- -		
NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G -82.51	10 ^{NOIE3}		/		-5	7.5	-84	.01
NR_FDD_FR1_G -82.51							-83	.51
							22	E4

		NR_FDD_FR1_A, NR_TDD_FR1_A			-79.41		
		NR_FDD_FR1_B			-78.91		
		NR_TDD_FR1_C	alD/		-78.41		
	Config 3,6	NR_FDD_FR1_D,	dBm/	-51.41	-77.91		
		NR_TDD_FR1_D	38.16MHz				
		NR_FDD_FR1_E,			-77.41		
		NR_TDD_FR1_E					
		NR_FDD_FR1_G			-76.41		
		NR_FDD_FR1_H			-75.91		
Propagat	tion condition		-	AWGN			
Antenna	configuration		-	1x2			
Note 1:		e used such that both	,		stant total		
	•	ower spectral density is		•			
Note 2:		rom other cells and no		•			
		subcarriers and time	and shall be m	odelled as AWGN of	appropriate power		
	for N_{oc} to be	fulfilled.					
Note 3:	Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for						
information purposes. They are not settable parameters themselves.							
	information pu	arposes. They are not	sellable paran	neters themselves.			
Note 4:	SS-SINR, SS	arposes. They are not -RSRP minimum requ and noise at each rece	irements are s	pecified assuming in	dependent		

A.4.7.3.1.3 Test Requirements

Note 5:

Note 6:

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

on band n51 in this release of the specification.

NR operating band groups are as defined in Clause 3.5.2.

A.4.7.3.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

The test configuration excludes support for band n51 and it is not required to run this test

A.4.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.14.1.1 and 10.1.14.1.2 for interfrequency measurement.

A.4.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.3.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Config	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.4.7.3.2.2-1: SS-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode	Config 1,4 Config 2,3,5,6	-				DD DD			
	Config 1,4					plicable			
TDD configuration	Config 2,5	1				onf.1.1			
g	Config 3,6	1				conf.2.1			
Downlink initial BWP cor					DLBV	VP.0.1			
Downlink dedicated BWF	configuration				DLBV	VP.1.1			
Uplink initial BWP config	_				ULBV	VP.0.1			
Uplink dedicated BWP c	onfiguration				ULBV	VP.1.1			
DRX Cycle configuration		ms			Not Ap	plicable			
	Config 1, 4					.1 FDD			
TRS configuration	Config 2, 5		TRS.1.1 TDD						
	Config 3, 6		TRS.1.2 TDD						
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD		
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-	
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD		
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	
	Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2. 1 TDD		

OCNG Pat	terns					0	P 1						
_				OP.1									
	SS-RSSI-Measurement			Not Applicable SMTC.1									
SIVITO COIT	SMTC configruation												
SSB configuration Config 1,2,4,5 Config 3,6			SSB.1 FR1 SSB.2 FR1										
Config 1 2 4 F													
PDSCH/PDCCH Config 1,2,4,5 Subcarrier spacing Config 3,6		kHz				5							
	<u> </u>	Config 3,6			r	3	30						
	of PSS to SSS of PBCH DMRS	to SSS											
	of PBCH to PBC		-										
EPRE ratio	of PDCCH DMR	RS to SSS											
	of PDCCH to PI		dB	0	0	0	0	0	0				
	of PDSCH DMR of PDSCH to PI												
		S to SSS(Note 1)											
		NG DMRS (Note 1)											
		NR_FDD_FR1_A											
		NR_TDD_FR1_A						-1	19.5				
		NOTE 6											
		NR_FDD_FR1_B	1						19				
Nere	Config	NR_TDD_FR1_C	dBm/15k						18.5				
$N_{\it oc}$ Note2	1,2,4,5	NR_FDD_FR1_D	Hz	-88 -88		-108.5							
		NR_TDD_FR1_D	-						18				
		NR_FDD_FR1_E						-11	17.5				
		NR_TDD_FR1_E											
		NR_FDD_FR1_G							16.5 16				
		NR_FDD_FR1_H				4.0			s Noc for				
	Co	Config 1,2,4,5				<u> </u>		-8	38	-10	8.5		kHz
	Config 3,6	NR_FDD_FR1_A											
		NR_TDD_FR1_A	- dBm/SC - S					-11	16.5				
$N_{\it oc}^{\rm Note2}$		NR_FDD_FR1_B				-105.5		-116					
IV oc		NR_TDD_FR1_C			25			-11	15.5				
		NR_FDD_FR1_D		-85		-105.5		-115					
		NR_TDD_FR1_D						-110					
		NR_FDD_FR1_E NR_TDD_FR1_E						-11	14.5				
		NR_FDD_FR1_G						-114.5					
		NR_FDD_FR1_H	<u> </u>	<u> </u>		<u> </u>			13				
\hat{E}_{s}/I_{ot}			dB	-1.	.75	2	0	-4	1.0				
\hat{E}_s/N_{oc}	\hat{E} /N \sim			-1.	.75	2	0	-4	1.0				
3, 00		NR_FDD_FR1_A											
		NR_TDD_FR1_A						_1'	23.5				
		NOTE 6						-12	-0.0				
		ND EDD ED4 D	-					<u> </u>	22				
SS-	Config	NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SC						23 22.5				
RSRPNot	1,2,4,5	NR_FDD_FR1_D	S	-89	.75	-88	3.5						
e3	.,_, .,	NR_TDD_FR1_D						-122					
		NR_FDD_FR1_E						_1′	21.5				
		NR_TDD_FR1_E	-										
		NR_FDD_FR1_G	-					-120.5					
		NR_FDD_FR1_H	1			1		-120					

_	1	ND EDD ED4 :	I			T
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-120.5
		NOTE 6		-86.75		
		NR_FDD_FR1_B				-120
	Config 3,6	NR_TDD_FR1_C			-85.5	-119.5
	Coming 0,0	NR_FDD_FR1_D		00.10	00.0	-119
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				-118.5
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				-117.5
		NR_FDD_FR1_H				-117
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				
		NOTE 6				
		ND 500 504 0				
		NR_FDD_FR1_B				
SS-S	INR Note3	NR_TDD_FR1_C	dB	-1.75	20	-4.0
		NR_FDD_FR1_D		,		
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
		NR_FDD_FR1_A				
		NR_TDD_FR1_A		-57.83	-60.5	-90.09
		NOTE				
		ND EDD ED4 D	-			00.50
	0 "	NR_FDD_FR1_B				-89.59
	Config 1,2,4,5	NR_TDD_FR1_C	dBm/			-89.09
		NR_FDD_FR1_D	9.36MHz			-88.59
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				-88.09
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				-87.09
Io ^{Note3}		NR_FDD_FR1_H				-86.59
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-84
		NOTE				
		ND EDD ED4 D				00.5
		NR_FDD_FR1_B	dBm/			-83.5
	Config 3,6	NR_TDD_FR1_C	38.16MH	-51.73	-54.41	-83
	3 - , ,	NR_FDD_FR1_D	z			-82.5
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				-82
		NR_TDD_FR1_E	-			0.4
		NR_FDD_FR1_G	-			-81
		NR_FDD_FR1_H				-80.5

Propagat	tion condition	-	AWGN	
Antenna	configuration	-	1x2	
Note 1:				
Note 2:	, ,			
Note 3:	3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 4:	4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 5:	· ·			
Note 6:	The test configuration excludes sup	port for ban	d n51 and it is not required to run this test on band n51 in this	

A.4.7.3.2.3 Test Requirements

release of the specification.

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.4.7.4 L1-RSRP measurement for beam reporting

A.4.7.4.1 SSB based L1-RSRP measurement

A.4.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.4.7.4.1.1-1.

Config Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 3 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 5 LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 The UE is only required to be tested in one of the supported test configurations in each supported band Note:

Table A.4.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

A.4.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.4.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

-					
	Parameter	Config	Unit	Test 1	Test 2

SSB GS0	CN	1~6		freq1	freq1
000 000	014	1,4		FDD	FDD
Duplex m	node	2,5	}	TDD	TDD
Duplex mode		3,6	}	TDD	TDD
		1,4		N/A	N/A
TDD Configuration		2,5		TDDConf.1.1	TDDConf.1.1
					TDDConf.2.1
		3,6		TDDConf.2.1	
		1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	ı	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
		3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
DD6CH I	Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
		2,5		SR.1.1 TDD	SR.1.1 TDD
measure	ment channel	3,6		SR.2.1 TDD	SR.2.1 TDD
D1401.06		1,4		CR.1.1 FDD	CR.1.1 FDD
	ORESET Reference	2,5	İ	CR.1.1 TDD	CR.1.1 TDD
Channel		3,6	İ	CR.2.1 TDD	CR.2.1 TDD
		1,4		CCR.1.1 FDD	CCR.1.1 FDD
	ed CORESET	2,5	1	CCR.1.1 TDD	CCR.1.1 TDD
Reference	ce Channel	3,6		CCR.2.1 TDD	CCR.2.1 TDD
		1,4		SSB.3 FR1	SSB.3 FR1
CCD con	figuration				
22P COU	figuration	2,5		SSB.3 FR1	SSB.3 FR1
00110.0		3,6		SSB.4 FR1	SSB.4 FR1
OCNG P	atterns	1~6		OP.1	OP.1
		1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration		2,5		TRS.1.1 TDD	TRS.1.1 TDD
		3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial B\/\	Initial BWP Configuration			DLBWP.0.1	DLBWP.0.1
miliai Bv	vi comgaration	1~6		ULBWP.0.1	ULBWP.0.1
Dedicate	ed BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
	onfiguration	1~6		ULBWP.1.1 SMTC.1	ULBWP.1.1 SMTC.1
reportCo		1~6			
		1~6		periodic	periodic
reportQu				ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~6		2	2
	P reporting period of PSS to SSS	1~6		slot80	slot80
	o of PBCH DMRS to SSS				
	o of PBCH to PBCH DMRS				
	o of PDCCH DMRS to SSS				
	o of PDCCH to PDCCH				
DMRS					
	o of PDSCH DMRS to SSS	1~6	dB	0	0
	EPRE ratio of PDSCH to PDSCH				
DMRS EPRE ratio of OCNG DMRS to					
SSS ^{Note 1}					
EPRE ratio of OCNG to OCNG DMRS Note 1					
_	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
N_{oc}	NR_FDD_FR1_B				-116.5
Note2	NR TDD FR1 C	1~6	dBm/15kHz	-94.65	-116
110102	NR_FDD_FR1_D,	. •		33	
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115

	ND EDD ED4 C		T	<u> </u>	1444
	NR_FDD_FR1_G				-114 -113.5
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				447
	NR_TDD_FR1_A NOTE 5				-117
					440.5
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C	1,2,4,5		04.0-	-116
	NR_FDD_FR1_D,			-94.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				444
λI	NR_FDD_FR1_G		dBm/SSB		-114
N_{oc}	NR_FDD_FR1_H		SCS		-113.5
Note2	NR_FDD_FR1_A,				444
	NR_TDD_FR1_A NOTE 5				-114
					440.5
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C	2.6		04.65	-114
	NR_FDD_FR1_D,	3,6		-91.65	-112.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR FDD FR1 G				-111
	NR FDD FR1 H				-110.5
-	TAIK_I DD_I IKI_II				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~6	dB	10	-3
	NR_FDD_FR1_A,			-84.65	
	NR_TDD_FR1_A				-120
	NOTE 5				
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,	1,2,4,5			-118.5
	NR_TDD_FR1_D				-110.5
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E				-110
SSB	NR_FDD_FR1_G				-117
RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A,		SCS		
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3,6		-81.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				111
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-87.28
	NR_IDD_FRI_A NOTE 5				-01.20
	NR_FDD_FR1_B				-86.78
lo Note3	NR_TDD_FR1_C	1,2,4,5	dBm/9.36	-56.28	-86.28
	NR_FDD_FR1_D,	1,4,7,0	MHz	-50.20	
	NR_TDD_FR1_D,				-85.78
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-85.28

NR_FDD_FR1_G				-84.28
NR_FDD_FR1_H				-83.78
NR_FDD_FR1_A,				
NR_TDD_FR1_A				-81.19
NOTE 5				
NR_FDD_FR1_B				-80.69
NR_TDD_FR1_C		dBm/38.16		-80.19
NR_FDD_FR1_D,	3,6	MHz	-50.19	-79.69
NR_TDD_FR1_D		IVII IZ		-7 9.09
NR_FDD_FR1_E,				-79.19
NR_TDD_FR1_E				-73.13
NR_FDD_FR1_G				-78.19
NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}	1~6	dB	10	-3
Propagation condition	1~6		AWGN	AWGN
Antenna configuration	1~6		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.4.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.4.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.4.7.4.2.1-1.

Table A.4.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	only required to be tested in one of the supported test configurations in each supported band

A.4.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.4.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
·	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
•	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measurement chainle	3,6		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD	CR.1.1 FDD
Channel	2,5		CR.1.1 TDD	CR.1.1 TDD
Chamer	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.1 FR1	SSB.1 FR1
SSB configuration	2,5		SSB.1 FR1	SSB.1 FR1
	3,6		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1	DLBWP.0.1
Initial BVVP Configuration	1~6		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
	1~0		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~6		SMTC.1	SMTC.1
	1,4		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2,5		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3,6		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~6		periodic	periodic
reportQuantity	1~6		cri-RSRP	cri-RSRP
Number of reported RS	1~6		2	2
L1-RSRP reporting period	1~6		slot80	slot80
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	1~6	dB	0	0

EDDE ***	of DDCCH DMDC to CCC		Γ		
	of PDCCH DMRS to SSS of PDCCH to PDCCH				
DMRS					
	EPRE ratio of PDSCH DMRS to SSS				
	of PDSCH to PDSCH				
DMRS					
EPRE ratio	of OCNG DMRS to				
	of OCNG to OCNG				
DMRS Note					
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-94.65	
NOTEZ	NR_TDD_FR1_D		GBITI/TOKITE	0 1.00	-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115
	NR FDD FR1 G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				110.0
	NR_TDD_FR1_A		dBm/CSI-RS SCS		-117
	NOTE 5	1,2,4,5		-94.65	117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,				-110
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
N_{oc}	NR_FDD_FR1_H				-113.5
Note2	NR_FDD_FR1_A,				110.0
Notez	NR_TDD_FR1_A			-91.65	-114
	NOTE 5				114
	NR FDD FR1 B	3,6			-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E,	†			
	NR_TDD_FR1_E,				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
Ĥ /T	<u> </u>	4.0	15	4.5	
\hat{E}_{s}/I_{ot}		1~6	dB	10	10
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-120
	NOTE 5				
	NR_FDD_FR1_B				-119.5
CSI-RS	NR_TDD_FR1_C		4D~/CCI DC		-119
RSRP	NR_FDD_FR1_D,	1,2,4,5	dBm/CSI-RS	-84.65	110 E
Note3	NR_TDD_FR1_D		SCS		-118.5
	NR_FDD_FR1_E,				140
	NR_TDD_FR1_E				-118
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
		1	1	1	I.

	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B	†			-116.5
	NR_TDD_FR1_C	•			-116
	NR_FDD_FR1_D,	3,6		-81.65	-115.5
	NR_TDD_FR1_D	1			-110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E	1			
	NR_FDD_FR1_G	1			-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				07.00
	NR_TDD_FR1_A		dBm/9.36 MHz		-87.28
	NR FDD FR1 B	1,2,4,5		-56.28	-86.78
	NR TDD FR1 C				-86.28
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E,				0= 00
	NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
10	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-81.19
	NOTE 5	1			
	NR_FDD_FR1_B	1			-80.69
	NR_TDD_FR1_C	_	dBm/38.16		-80.19
	NR_FDD_FR1_D,	3,6	MHz	-50.19	-79.69
	NR_TDD_FR1_D	1			
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G	1			-78.19
	NR FDD FR1 H	†			-77.69
\hat{E}_s/N_{oo}		1~6	dB	10	-3
	Propagation condition		-	AWGN	AWGN
	configuration	1~6 1~6		1x2	1x2
Antenna	Comiguration	1~0		IAC	IAZ

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.2.

A.4.7.5 SFTD accuracy

A.4.7.5.1 SFTD accuracy

A.4.7.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for EN-DC SFTD measurements.

A.4.7.5.1.2 Test Parameters

Supported test configurations are shown in Table A.4.7.5.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is NR FR1 PSCell. The test parameters of cell 1 are given in clause A.3.7.2.1. The test parameters of cell 2 are given in Table A.4.7.5.1.2-2. The SFTD between PCell and PSCell shall be set by the test equipment to one of the time differences in Table A.4.7.5.1.2-3.

Table A.4.7.5.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD		
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD		
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD		
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.4.7.5.1.2-2: Test parameters for SFTD accuracy

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
	1,4		SR.1.1 FDD
PDSCH Reference measurement channel	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
	1,4		CCR.1.1 FDD
RMC CORESET Reference Channel	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD
	1,4		SSB.1 FR1
SSB configuration	2,5		SSB.1 FR1
	3,6		SSB.2 FR1

SMTC config	nuration	1~6		SMTC.1	
DL BWP configuration		1~6		DLBWP.1.1	
UL BWP configuration		1~6		ULBWP.1.1	
	OCNG Patterns			OP.1	
	EPRE ratio of PSS to SSS				
	EPRE ratio of PBCH DMRS to SSS				
EPRE ratio o	EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio o	of PDCCH DMRS to SSS				
EPRE ratio o	of PDCCH to PDCCH DMRS	1~6	dB	0	
EPRE ratio o	of PDSCH DMRS to SSS				
	of PDSCH to PDSCH DMRS				
EPRE ratio o	of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio o	of OCNG to OCNG DMRS Note 1				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	4			
	NR_FDD_FR1_B	4			
	NR_TDD_FR1_C NR_FDD_FR1_D,	4			
$N_{oc}^{ m Note2}$	NR_TDD_FR1_D,	1~6	dBm/15kHz	-104	
	NR_FDD_FR1_E,	1			
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	1			
	NR_FDD_FR1_B	4			
	NR_TDD_FR1_C NR FDD FR1 D,	4			
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		-104	
	NR_FDD_FR1_E,	1			
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
$N_{oc}^{ m Note2}$	NR_FDD_FR1_H		dBm/SSB SCS		
1 voc	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	4			
	NR_FDD_FR1_B	_			
	NR_TDD_FR1_C	1			
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6		-101	
	NR_FDD_FR1_E,	-			
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~6	dB	-3	
\hat{E}_s/N_{oc}		1~6	dB	-3	
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	1			
	NR_FDD_FR1_B	4			
	NR_TDD_FR1_C	4			
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		-107	
	NR_FDD_FR1_E,	1			
SS-RSRP	NR_TDD_FR1_E				
Note3	NR_FDD_FR1_G	1	dBm/SCS		
	NR_FDD_FR1_H	1			
	NR FDD FR1 A.		7		
	NR_TDD_FR1_A NOTE 5	1			
	NR_FDD_FR1_B	3,6		-104	
	NR_TDD_FR1_C]			
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D				

	T				
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5				
	NR_FDD_FR1_B				
	NR_TDD_FR1_C				
	NR_FDD_FR1_D,	1015	dDm/O 2C MILE	74.00	
	NR_TDD_FR1_D	1,2,4,5	dBm/9.36 MHz	-74.28	
Io Note3	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
	NR_FDD_FR1_A,		dBm/38.16 MHz	-68.18	
	NR_TDD_FR1_A NOTE 5				
	NR_FDD_FR1_B				
	NR_TDD_FR1_C				
	NR_FDD_FR1_D,	2.0			
	NR_TDD_FR1_D	3,6			
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
Propagation	Propagation condition			AWGN	
Antenna con	figuration	1~6		1x2	
Note 1: 0	OCNG shall be used such tha	t both cells are	fully allocated and	a constant total	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.4.7.5.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)		
1	100	-122000		
2	300	-60540		
3	500	1000		
4	700	62540		
5	900	124000		

A.4.7.5.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and PSCell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.4.7.5.2 Void

A.4.7.5.3 Void

A.4.8 Void

A.5 EN-DC tests with one or more NR cells in F)	C tests with on	e or more NR	cells in	FK2
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- A.5.1 Void
- A.5.2 Void
- A.5.3 RRC_CONNECTED state mobility
- A.5.3.1 Void
- A.5.3.2 RRC Connection Mobility Control
- A.5.3.2.1 Void
- A.5.3.2.2 Random Access
- A.5.3.2.2.1 Contention based random access test in FR2 for PSCell/SCell in EN-DC
- A.5.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.1.1-1. UE capble of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.1.1-2 and Table A.5.3.2.2.1.1-3.

Table A.5.3.2.2.1.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

	Config	Description				
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex				
ı		mode				
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex				
	2	mode				
Note:	The UE is only required to be tested in one of the supported test configurations depending on UE					
	capability					

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

Parame	ter	Unit	Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per SS	-burst		2	Different from the definition in A.3.10
SS/PBCH block index			0,1	Different from the definition in A.3.10
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration Config 1,2			TDDConf.3.1	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Config 1,2			SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Number	NR RF Channel Number		1	
EPRE ratio of PSS to SS	SS	dB		
EPRE ratio of PBCH_DN	EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS		dB		
EPRE ratio of PDCCH_DMRS to SSS		dB	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_D	MRS to SSS	dB		
EPRE ratio of PDSCH to	PDSCH_DMRS	dB		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.5.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

	Parameter	Unit	Test-1	Comments	
AoA setup			Setup 2b	As defined in A.3.15.2.2.	
SSB with index 0	th SSB_RP dB [10] dB larger than SSB_		[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp- ThresholdSSB	
SSB with index 1 SSB_RP		dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-ThresholdSSB</i>	
Configured U $P_{\mathrm{CMAX, f, c}}$)	E transmitted power (dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.	
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3.	
preambleReceivedTargetPower		dBm	-60		
Propagation Condition		-	AWGN		

A.5.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.5.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received

Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.5.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.5.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.5.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.5.3.2.2.2 Non-contention based random access test in FR2 for PSCell/SCell in EN-DC

A.5.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.2.1-1. UE capble of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.2.1-2 and Table A.5.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.5.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

	Config Description						
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex					
I		mode					
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex					
2		mode					
Note:	The UE is only required to be tested in one of the supported test configurations depending on UE						
	capability						

Table A.5.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parame	eter	Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	SSB pattern 1 in FR2	As defined in A.3.10, except of Number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per	SS-burst		2	2	Different from the definition in A.3.10
SS/PBCH block inde	ex		0,1	0,1	Different from the definition in A.3.10
CSI-RS Configuration	Config 1,2		N/A	CSI-RS.3.1 TDD	As defined in A.3.1.4
Duplex Mode for Cell 2	Config 1,2		TDD	TDD	
TDD Configuration Config 1,2			TDDConf.3.1	TDDConf.3.1	
OCNG Pattern Note 1			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH Config 1,2 parameters Note 2			SR3.X TDD	SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Nun	nber		1	1	
EPRE ratio of PSS to	o SSS	dB			
EPRE ratio of PBCH	_	dB			
EPRE ratio of PBCH PBCH_DMRS	to	dB			
EPRE ratio of PDCCH_DMRS to SSS		dB		0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS		dB			
EPRE ratio of PDSC PDSCH_DMRS	H to	dB			

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.5.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

AoA setup SSB with index 0 SSB with index 1 SSB_RP SSB_RP		Unit	Test-1	Test-2	Comments	
			Setup 2b	Setup 2b	As defined in A.3.15.2.2.	
		dB	[10] dB larger than SSB_RP for SSB index 1	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured <i>rsrp-</i> <i>ThresholdSSB</i>	
		dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-</i> <i>ThresholdSSB</i>	
Configured UE transmitted power ($P_{\mathrm{CMAX, f, c}}$)		dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.	
PRACH Configuration		-	FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3.	
preambleReceivedTargetPower		dBm	-60	-60		
Propagation Co	ndition	-	AWGN	AWGN		

Note 1: No articial noise is applied in this test.

Note 2: void.

A.5.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.5.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.3 Void

A.5.4 Timing

A.5.4.1 UE transmit timing

A.5.4.1.1 NR UE Transmit Timing Test for FR2

A.5.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 5.4.1.1.1-1.

Table A.5.4.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.1.1-2 and A.5.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.1.1-3.

Table A.5.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2	Freq1	Freq1	
Duplex Mode		1,2	TDD		
TDD configuration		1,2	TDDC	onf.1.2	
BW _{channel}	MHz	1,2	100: N _F	_{RB,c} = 66	
Initial BWP Configuration		1,2		VP.0.1 VP.0.1	
Dedicated BWP Configuration		1,2		VP.1.1 VP.1.1	
TRS Configuration		1,2	TRS.2	.1 TDD	
TCI State		1,2	CSI-RS.Config.0		
DRx Cycle	ms	1,2	N/A	DRX.5 ^{Note5}	
PDSCH Reference measurement channel		1,2	SR.3.1 TDD		
CORESET Reference Channel		1,2	CR.3.1 TDD		
OCNG Patterns		1,2	OCNG pattern 1		
SSB Configuration		1,2	SSB.2 FR2		
SMTC Configuration		1,2	SMTC.1		
PDSCH/PDCCH	kHz	1,2	120		
subcarrier spacing	KITZ		120		
EPRE ratio of PSS to SSS	dВ	4.2	0	0	
EPRE ratio of PBCH DMRS to SSS	dB	1,2	0 0		

EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation condition	1,2	AW	GN	
SRS Config	1,2	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: DRx related parameters are given in Table A.3.3.5-1
- Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2		
Angle of arrival configuration		Setup 1 according to clause A.3.1			
$N_{oc}^{$ Note1	dBm/15kHz ^{Note4}	-112			
$N_{oc}^{ m Note1}$	dBm/SCS ^{Note3}	-103			
\hat{E}_s/N_{oc}	dB	4			
SS-RSRP ^{Note2}	dBm/SCS Note4	-9	9		
\hat{E}_s/I_{ot}	dB	4			
Io ^{Note2}	dBm/95.04 MHz Note4	-68.5			
	er cells and noise sources n	•			

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

SRSConf.1 SRSConf.2 Comments SRS-ResourceSet srs-ResourceSetId 0 0 srs-ResourceldList 0 0 resourceType Periodic Periodic Codebook Usage Codebook SRS-Resource SRS-Resourceld 0 0 nrofSRS-Ports Port1 Port1 transmissionComb n2 n2 combOffset-n2 0 0 cyclicShift-n2 0 0 0 resourceMapping 0 startPosition resourceMapping n1 n1 nrofSymbols resourceMapping n1 n1 repetitionFactor freqDomainPosition 0 0 freqDomainShift 0 0 freqHopping Matches N_{RB,c} c-SRS 0 0 freqHopping b-SRS

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

Table A.5.4.1.1.1-4: Void

0

Neither

Periodic

sl1,0

0

0

Neither

Periodic

sl2560,0

0

Offset to align with DRx periodicity

Any 10 bit number

A.5.4.1.1.2 Test requirements

freqHopping

resourceType

sequenceld

groupOrSequenceHopping

periodicityAndOffset-p

b-hop

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.2-1 and setup NR PSCell according to parameters given in Table A.5.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.1.2-1

Table A.5.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value			
	Test1	Test2		

240	+8*64T _c	+4*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.5.4.2 UE timer accuracy

A.5.4.3 Timing advance

A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

A.5.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.5.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.5.4.3.1.2-1: Timing advance supported test configurations

Config Description					
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	equired to be tested in one of the supported test configurations			

Table A.5.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T_A) value during T1		31	N _{TA_new=} N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS $NTA_new = NTA_old + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance

l lmi4	Test1				
Unit	T1 T2				
	TDD				
	TDDConf.3.1				
MHz	100: $N_{RB,c} = 66$				
MHz	100: $N_{RB,c} = 66$				
ms	Not Applicable				
	SR.3.1 TDD				
	CR.3.1 TDD				
	TRS.2.1 TDD				
	CSI-RS.Config.0				
	OCNG pattern 1				
	SMTC.1 FR2				
kHz	120 kHz				
kHz	120 kHz				
٩D	0				
uБ	0				
-	AWGN				
	MHz ms				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	Te	est 1	
			T1	T2	
Angle of	arrival configuration		Setup 1 according	g to clause A.3.15.1	
N_{oc} Note1		dBm/15kHz ^{Note4}	-112		
$N_{oc}^{}$ Note1		dBm/SCS ^{Note3}		103	
\hat{E}_s/N_{oc}	;	dB	4		
SS-RSRF	Note2	dBm/SCS Note4	-	99	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB		4	
Io ^{Note2}		dBm/95.04 MHz Note4	-6	8.5	
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm oc}$ to be fulfilled.				
Note 2:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4: Note 5:	Equivalent power red	ceived by an antenna with 0d Bi gain antenna at the centre		of the quiet zone	

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment				
c-SRS	16	Eraguanay hanning in disabled				
b-SRS	0	Frequency hopping is disabled				
b-hop	0					
freqDomainPosition	0	Frequency domain position of SRS				
freqDomainShift	0					
groupOrSequenceHopping	neither	No group or sequence hopping				
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots				
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation				
usage	Codebook	Codebook based UL transmission				
startPosition	0	resourceMapping setting. SRS on last				
nrofSymbols	n1	symbol of slot, and 1symbols for SRS				
repetitionFactor	n1	without repetition.				
combOffset-n2	0	transmissionComb setting				
cyclicShift-n2	0	transmissionComb setting				
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission				
Note: For further information see clause 6.3.2 in TS 38.331 [2].						

A.5.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=11.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.5.5 Signaling characteristics

A.5.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.5.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.1.1-1. The test parameters are given in Tables A.5.5.1.1.1-2, A.5.5.1.1.1-3, and A. 5.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.5.5.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration	onfiguration Description					
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note: The U	JE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Parameter		Unit	Value		
			Test 1		
Active E-UTRA	PCell			Cell 1	
E-UTRA RF Ch				1	
Active PSCell				Cell 2	
RF Channel Number			2		
Duplex mode		Config 1, 2		TDD	
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1	
DL dedicated B		Config 1, 2		DLBWP.1.1	
configuration		G .			
UL initial BWP		Config 1, 2		ULBWP.0.1	
UL dedicated B	WP	Config 1, 2		ULBWP.1.1	
configuration					
TDD Configurat		Config 1, 2		TDDConf.3.1	
CORESET Refe	erence	Config 1, 2		CR.3.1 TDD	
Channel					
SSB Configurat		Config 1, 2		SSB.1 FR2	
SMTC Configur	ation	Config 1, 2		SMTC.1	
PDSCH/PDCCI	H subcarrier	Config 1, 2		120 KHz	
spacing					
PRACH Config		Config 1, 2		Table A.3.8.3.4	
SSB index assi	gned as RLM	Config 1, 2		0,1	
RS					
OCNG paramet	ers			OP.2	
CP length				Normal	
Correlation Mat		a Configuration		2x2 Low	
	DCI format			1-0	
	Number of Co	ntrol OFDM		2	
Out of sync	symbols			_	
transmission	Aggregation le		CCE	8	
parameters		hetical PDCCH RE	dB	4	
	energy to ave	rage SSS RE			
	energy	hadaal BDOOLL	JD.		
		hetical PDCCH	dB	4	
		to average SSS RE			
	energy DMRS precod	lor gropulority		REG bundle size	
	REG bundle s			6	
DRX	REG bullate s	iize		OFF	
Gap pattern ID Layer 3 filtering				gp0 Enabled	
	_		me	 0	
T310 timer T311 timer			ms		
	-		ms	1000	
N310 N311				<u>1</u> 1	
CSI-RS for CSI	reporting	Config 1 2		CSI-RS.3.1 TDD	
TCI states for P		Config 1, 2			
		_		TCI.State.2	
CSI-RS for tracking Config 1, 2		Corning 1, 2		TRS.2.1 TDD	
			S	0.2	
T1			S	9.68	
T1 T2			•	0.60	
T1			S S	9.68 9.64	

Note 3: E-UTRAN is in non-DRX mode under test.

Test 1

Note 3: Note 4:

Table A.5.5.1.1.1-3: OTA related cell

Unit

specific test parame for out-of-sync rad	io link monitoring		T1	T2	Т3	T1	T2	Т3
tests in non-DRX	tests in non-DRX modeParameter							
AoA setup					up 3 defir	ned in A.		
				AoA1			AoA2	
EPRE ratio of PDCCH	DMRS to SSS	dB		4				
EPRE ratio of PDCCH	to PDCCH DMRS	dB						
EPRE ratio of PBCH D	MRS to SSS	dB						
EPRE ratio of PBCH to	PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB		0		Not sent		
EPRE ratio of PDSCH	DMRS to SSS	dB				Not Sent		
EPRE ratio of PDSCH	to PDSCH DMRS	dB						
EPRE ratio of OCNG I	DMRS to SSS	dB						
EPRE ratio of OCNG t	o OCNG DMRS	dB						
ssb-Index 0 SNR	Config 1, 2	dB	2	- 6	-15			
ssb-Index 1 SNR	Config 1, 2			Not sent		2	-15	-15
SNR on other	Config 1, 2	dB	2 N/A					
channels and signals			Z IN/A					
N_{oc}	Config 1, 2	dBm/ 15kHz		[-92.1]		[-92.1]		
Propagation condition			TDL	TDL-A 30ns 75Hz TDL-A 30ns 7		'5Hz		
Note 1: OCNG shall	resource							
transmitted power spectral density is achieved for all OFDM symbols.								
1								

Table A.5.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

The SNR values are specified for testing a UE which supports 2RX on at least one band. For

SNR levels correspond to the signal to noise ratio over the SSS REs.

testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Field	Test 1
Field	Value
gapOffset	0
	d PSCell are SFN- ame boundary aligned. S is partially overlapped with

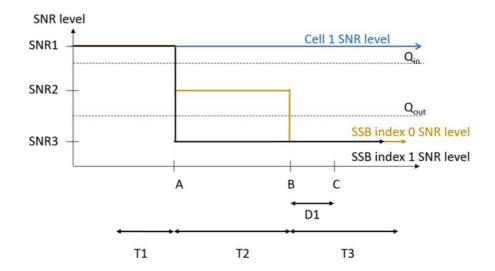


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Configuration Description					
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Parameter		Unit	Value		
				Test 1	
Active E-UTRA	PCell			Ce1l 1	
	nannel Number			1	
Active PSCell	iaillei Nullibei			Cell 2	
RF Channel No	ımhor			2	
Duplex mode	unbei	Config 1, 2		TDD	
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1	
DL dedicated E		Config 1, 2		DLBWP.1.1	
	DVVP	Corning 1, 2		DLBWP.1.1	
configuration UL initial BWP	configuration	Config 1, 2		ULBWP.0.1	
UL dedicated E		Config 1, 2		ULBWP.1.1	
configuration	SVVP	Coning 1, 2		ULBVVP.1.1	
TDD Configura	tion	Config 1, 2		TDDConf.3.1	
CORESET Ref		Config 1, 2		CR.3.1 TDD	
Channel	0101100	Johns 1, 2		014.6.1 122	
SSB Configura	tion	Config 1, 2		SSB.1 FR2	
SMTC Configu		Config 1, 2		SMTC.3	
PDSCH/PDCC	H subcarrier	Config 1, 2		120 KHz	
spacing					
PRACH Config	uration	Config 1, 2		Table A.3.8.3.4	
SSB index ass		Config 1, 2		0,1	
RS	9	, , _		-,.	
OCNG parame	ters			OP.2	
CP length				Normal	
Correlation Ma	trix and Antenna	Configuration		2x2 Low	
In sync	DCI format	•		1-0	
transmission	Number of Cor	ntrol OFDM symbols		2	
parameters	Aggregation le		CCE	4	
		etical PDCCH RE	dB	0	
	energy to avera	age SSS RE energy			
	Ratio of hypoth		dB	0	
	DMRS energy	to average SSS RE			
	energy				
	DMRS precode	er granularity		REG bundle size	
	REG bundle si	ze		6	
Out of sync	DCI format			1-0	
transmission		ntrol OFDM symbols		2	
parameters				8	
Ratio of hypothetical PDCCH RE		dB	4		
	energy to average SSS RE energy				
	Ratio of hypoth	etical PDCCH	dB	4	
	DMRS energy to average SSS RE				
	energy				
	DMRS precode			REG bundle size	
REG bundle size				6	
DRX				OFF	

Gap pattern ID			N.A.		
Layer 3 filtering			Enabled		
T310 timer		ms	4000		
T311 timer		ms	1000		
N310			1		
N311			1		
CSI-RS for CSI reporting	Config 1, 2		CSI-RS.3.1 TDD		
TCI states for PDCCH/PDSC	H		TCI.State.2		
CSI-RS for tracking	Config 1, 2		TRS.2.1 TDD		
T1		S	0.2		
T2		S	0.2		
T3		S	1.88		
T4		S	0.2		
T5		S	3.84		
D1		S	3.8		
Note 1: All configurations a	are assigned to the UF	prior to the start	of time period T1		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Param	Unit	Test 1										
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup				Setup 3 defined in A.3.15								
·					AoA1					AoA2		
EPRE ratio of PDCCH	DMRS to SSS	dB			4							
EPRE ratio of PDCCH	to PDCCH DMRS	dB										
EPRE ratio of PBCH D	MRS to SSS	dB										
EPRE ratio of PBCH to	o PBCH DMRS	dB										
EPRE ratio of PSS to	SSS	dB					Nataont					
EPRE ratio of PDSCH	EPRE ratio of PDSCH DMRS to SSS		0					Not sent				
EPRE ratio of PDSCH	to PDSCH DMRS	dB										
EPRE ratio of OCNG I	EPRE ratio of OCNG DMRS to SSS											
EPRE ratio of OCNG t	to OCNG DMRS	dB										
ssb-Index 0 SNR	Config 1, 2	dB	2	-6	-15	-4.5	2					
ssb-Index 1 SNR	Config 1, 2		Not sent			2	-15	-15	-15	-15		
SNR on other	Config 1, 2	dB	2		2 N/A							
channels and signals			2		IN/A							
N_{oc}	Config 1, 2	dBm/ 15KHz	[-92.1]		[-92.1]							
Propagation condition	•			TDL	-A 30ns 7	′5Hz			TDI	A 30ns 7	′5Hz	

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

SNR1, SNR5 SNR4 SNR2 SNR3 A B C D E E

Table A.5.5.1.2.1-4: Void

Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

T3

D1

T5

T4

A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

T1 T2

A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration	onfiguration Description				
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Value		
Test 1		
Cell 1		
1		
Cell 2		
2		
TDD		
100: N _{RB,c} = 66		
DLBWP.0.1		
DLBWP.1.1		
ULBWP.0.1		
ULBWP.1.1		
ULBVVP.I.I		
TDDConf.3.1		
CR.3.1 TDD		
CR.S.T TDD		
SSB.1 FR2		
SMTC.1		
120 KHz		
120 1412		
Table A.3.8.3.4		
0,1		
-,-		
OP.1		
Normal		
2x2 Low		
1-0		
2		
8		
4		
4		
REG bundle size		
6		
DRX.3		
N.A.		
Enabled		
0		
1000		
1		
1		
CSI-RS.3.1 TDD		
TCI.State.2		
TRS.2.1 TDD		
0.2		
14.48		
14.48		
14.44 tart of time period T1.		

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

Paramet	Unit	Test 1					
			T1	T2	Т3		
AoA setup		Setup 1 defined in A.3.15					
EPRE ratio of PDCCH DM	RS to SSS	dB	4				
EPRE ratio of PDCCH to F	PDCCH DMRS	dB	0				
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DM	RS to SSS	dB	0				
EPRE ratio of PDSCH to F	DSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	2	-6	-15		
ssb-Index 1 SNR	Config 1, 2		2	-15	-15		
SNR on other channels Config 1, 2 and signals		dB	2				
N_{oc}	Config 1, 2	dBm/15K Hz	-104.7dBm				
Propagation condition		TDL-A 30ns 75Hz					
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total							

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.3.1-4: Void

Table A.5.5.1.3.1-5: Void

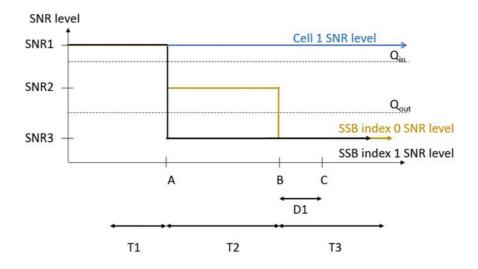


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration Description						
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Paramete	r	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
DL initial BWP configuration	Config 1, 2		DLBWP.0.1

DL dedicated E	BWP C	onfig 1, 2		DLBWP.1.1
configuration				
UL initial BWP configuration Config 1, 2			ULBWP.0.1	
UL dedicated E	UL dedicated BWP Config 1, 2			ULBWP.1.1
configuration				
TDD Configura	tion C	onfig 1, 2		TDDConf.3.1
CORESET Ref	erence	onfig 1, 2		CR.3.1 TDD
Channel		_		
SSB Configura	tion C	onfig 1, 2		SSB.1 FR2
SMTC Configu	ration C	onfig 1, 2		SMTC.3
PDSCH/PDCC	H subcarrier C	onfig 1, 2		120 KHz
spacing				
PRACH Config	uration C	onfig 1, 2		Table A.3.8.3.4
SSB index assi	igned as RLM C	onfig 1, 2		0,1
RS				
OCNG parame	ters			OP.1
CP length				Normal
Correlation Ma	trix and Antenna Co	nfiguration		2x2 Low
In sync	DCI format			1-0
transmission	Number of Contro	I OFDM symbols		2
parameters	Aggregation level	•	CCE	4
	Ratio of hypothetic	cal PDCCH RE	dB	0
	energy to average			•
	Ratio of hypothetic		dB	0
	DMRS energy to a			•
	energy			
	DMRS precoder g	ranularity		REG bundle size
	REG bundle size			6
Out of sync	DCI format			1-0
transmission	Number of Control OFDM symbols			2
parameters	Aggregation level	· · · · · · · · · · · · · · · · · · ·	CCE	8
	Ratio of hypothetic	cal PDCCH RF	dB	4
	energy to average			·
	Ratio of hypothetic		dB	4
	DMRS energy to a			
	energy			
	DMRS precoder g	ranularity		REG bundle size
	REG bundle size			6
DRX Configura				DRX.11
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				<u>.</u> 1
CSI-RS for CSI reporting Config 1, 2			CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking Config 1, 2			TRS.2.1 TDD	
T1			S	0.2
T2		S	0.2	
T3		S	2.8	
T4		S	0.2	
T5		S	3.88	
D1				3.84
	onfigurations are as	signed to the LIE n	s rior to the sta	art of time period T1.
	specific PDCCH is n			ii oi iiile peliou i I.
	TRAN is in non-DR	or manomilieu alle (mode under test	ו וו אומווא.	
NOIE 3. E-U	TIVALIA III HOHEDRA	THOUSE WHILE ISSE.		

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring test in DRX mode

Para	Unit			Test 1			
			T1	T2	T3	T4	T5
AoA setup			Setup 1	defined	in A.3.1	5	
EPRE ratio of PDCCH	DMRS to SSS	dB			4		
EPRE ratio of PDCCH	to PDCCH DMRS	dB			0		
EPRE ratio of PBCH D	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB			0		
EPRE ratio of PDSCH	to PDSCH DMRS	dB					
EPRE ratio of OCNG D	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	2	-6	-15	-4.5	2
ssb-Index 1 SNR	Config 1, 2		2	-15	-15	-15	-15
SNR on other Config 1, 2 channels and signals		dB			2		
N _{oc} Config 1, 2		dBm/1 5KHz		-	104.7dE	3m	
Propagation condition			TDL	-A 30ns	75Hz		
	be used such that the			,			

constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 3:

The SNR values are specified for testing a UE which supports 2RX on at least one Note 4: band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.4.1-4: Void

Table A.5.5.1.4.1-5: Void

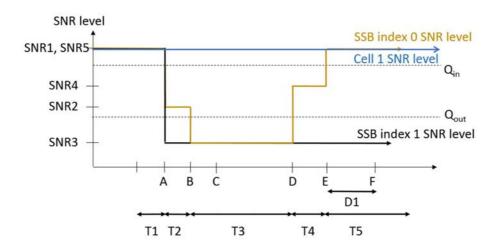


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

A.5.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.5.1-1, A.5.5.1.5.1-2, A.5.5.1.5.1-3 and A.5.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel I	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex Mode			TDD
TDD Configuration	Config 1		TDDConf.3.1
	Config 2		TDDConf.3.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1
RMC CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
	Config 2		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
	Config 2		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
	Config 2		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	Config 2		120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for F	PDCCH#1/PDSCH		TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
T1		s	0.2
T2		s	0.35
T3		S	0.35
D1		s	0.31
	PDCCH is not transmitted after T n non-DRX mode under test.	1 starts.	

Table A.5.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit		Test 1		
			T1 T2 T3			
AoA setup			Setup TBD defined in A.3.15			
PDCCH_be	eta	dB		4		
PDCCH_DI	MRS_beta	dB		4		
PBCH_beta	ì	dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_be	ta	dB	_			
OCNG_beta	<u>a </u>	dB				
SNR on RLM-RS1	Config 1,2	dB	2	-6	-15	
SNR on RLM-RS2	Config 1,2		2	-14	-15	
SNR on other channels and signals	Config 1, 2	dB	2			
N_{oc}	Config 1 Config 2	dBm/15KHz	TBD			
Propagation	n condition			TDL-A 30ns 75Hz		
te	otal transmitte	d power spectral den	sity is achieved for	2 are fully allocated a or all OFDM symbols to the UE prior to the		
Note 3: P	period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.				the UE prior to	
Note 4: N	Measurement gap configuration is assigned to the UE prior to the start of time period T1.					

Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time

period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.5.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.5.1-3A: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field	
	gapOffset	0
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table A.5.5.1.5.1-4: Void

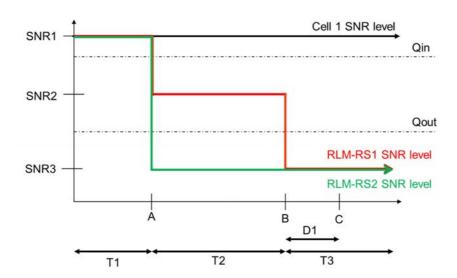


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.6.1-1, A.5.5.1.6.1-2, and A.5.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Configuration	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.6.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Chan			1
Active PSCell			Cell 2
RF Channel Numb	oer		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2		TDDConf.3.1
DL initial BWP	Config 1, 2		DLBWP.0.1
configuration	3 ,		-
DL dedicated	Config 1, 2		DLBWP.1.1
BWP	3 7		
configuration			
UL initial BWP	Config 1, 2		ULBWP.0.1
configuration	_		
UL dedicated	Config 1, 2		ULBWP.1.1
BWP			
configuration			
RMC CORESET	Config 1		CCR.3.1 TDD
Reference			CCR.3.3 TDD
Channel	Config 2		CCR.3.1 TDD
			CCR.3.3 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	Config 2		120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD
	=		Resource #4 in TRS.2.2 TDD
OCNG parameters			OP.1
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
	for PDCCH#1/PDSCH		TCI.State.2
TCI configuration	for PDCCH#2		TCI.State.3
CP length			Normal
Correlation Matrix	and Antenna		2x2 Low
Configuration	1		
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311	1 -		1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: UE-spe	ecific PDCCH is not transmi	tted after T1 sta	rts.
Note 2: E-UTRA	N is in non-DRX mode unde	er test.	

Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup 7	BD defined i	n A.3.15	
PDCCH_beta		dB			4		
PDCCH_DMRS	S_beta	dB			4		
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB			0		
PDSCH_beta		dB					
OCNG_beta		dB	7				
SNR on	Config 1, 2	dB	2	-6	-15	-4.5	2
RLM-RS1							
SNR on	Config 1, 2	dB	2	-14	-15	-15	-14
RLM-RS2							
SNR on other						·	
channels and Config 1, 2 dB		dB	2				
signals							
N_{oc}	Config 1, 2	dBm/15KHz	TBD				
Propagation co	ndition			[T[DL-A 30ns 75	Hz]	

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

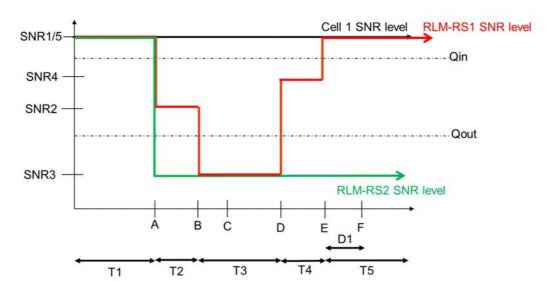


Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.7.1-1: Supported test configurations for FR2 PSCell

Configuration	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.7.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter	Unit	Value
		Test 1

Activo E LITDA	2Call		Cell 1
Active E-UTRA			
E-UTRA RF Cha	innei Number	-	1
Active PSCell			Cell 2
RF Channel Nur	nber		2
Duplex Mode	T =		TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2		TDDConf.3.1
DL initial BWP	Config 1, 2		DLBWP.0.1
configuration	Comig 1, 2		DEBWF.0.1
DL dedicated			
BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP	Config 1 2		LIL DWD O 4
configuration	Config 1, 2		ULBWP.0.1
UL dedicated			
BWP	Config 1, 2		ULBWP.1.1
configuration			
RMC	Config 1		CCR. 3.1 TDD
CORESET	Jan. 19		CCR.3.3 TDD
Reference	Config 2	1	CCR. 3.1 TDD
Channel			CCR.3.3 TDD
SSB	Config 1	+	SSB.1 FR2
Configuration	Config 2	+	SSB.1 FR2
SMTC			
	Config 1	_	SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDCC	Config 1		120 KHz
H subcarrier	Config 2	1	120 KHz
spacing	9		
CSI-RS for	Config 1, 2		Resource #4 in TRS.2.1 TDD
RLM			Resource #4 in TRS.2.2 TDD
TRS configuration	n		TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration			TCI.State.2
PDCCH#1/PDS0			
TCI configuration			TCI.State.3
OCNG paramete	ers		OP.1
CP length			Normal
Correlation Matr	ix and Antenna		
			2x2 Low
Configuration			2x2 Low
Configuration Out of sync	DCI format		-
	DCI format Number of Control		2x2 Low 1-0 2
Out of sync	Number of Control		1-0
Out of sync transmission	Number of Control OFDM symbols	CCE	1-0
Out of sync transmission	Number of Control OFDM symbols Aggregation level	CCE dB	1-0
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical	CCE dB	1-0 2 8
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to		1-0 2 8
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE		1-0 2 8
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	1-0 2 8 4
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical		1-0 2 8
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS	dB	1-0 2 8 4
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	1-0 2 8 4
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	1-0 2 8 4
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder	dB	1-0 2 8 4
Out of sync transmission	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	1-0 2 8 4
Out of sync transmission parameters	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder	dB	1-0 2 8 4 REG bundle size 6
Out of sync transmission parameters DRX	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	1-0 2 8 4 REG bundle size
Out of sync transmission parameters DRX Gap pattern ID	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	1-0 2 8 4 REG bundle size 6
Out of sync transmission parameters DRX	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	1-0 2 8 4 REG bundle size 6 DRX.3
Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled
Out of sync transmission parameters DRX Gap pattern ID	Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	1-0 2 8 4 REG bundle size 6 DRX.3 N.A.

	1
	1
	CSI-RS.3.1 TDD
	CSI-RS.3.1 TDD
S	0.2
S	1.28
S	1.28
S	1.24
	\$ \$

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
AoA setup			Setup	TBD defined in	A.3.15
PDCCH_beta		dB		4	
PDCCH_DMRS	_beta	dB		4	
PBCH_beta		dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_beta		dB			
OCNG_beta		dB			
SNR on RLM- RS1	Config 1, 2	dB	2	-6	-15
SNR on RLM- RS2	Config 1, 2		2	-14	-15
SNR on other channels and signals	Config 1, 2	dB	2		
	Config 1	dBm/15KHz	-104.7		
N_{oc}	Config 2			-104.7	
Propagation cor	ndition		DL-A 30ns 75Hz		

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.7.1-3A: Void

Table A.5.5.1.7.1-4: Void

Table A.5.5.1.7.1-5: Void

Table A.5.5.1.7.1-6: Void

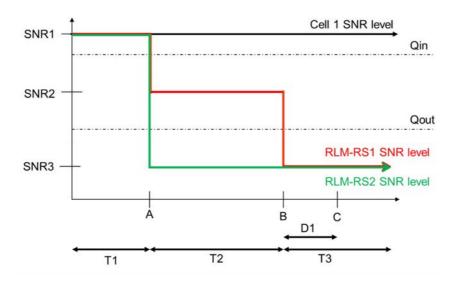


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.8.1-1, A.5.5.1.8.1-2, A.5.5.1.8.1-3 and A.5.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.8.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active E-UTR	A DCall		Cell 1
	hannel Number		1
Active PSCell	name number		Cell 2
RF Channel N	umbor		2 2
Duplex Mode	umber		TDD
TDD	Config 1		TDDConf.3.1
Configuratio	Config 2	-	TDDConf.3.1
n	Cornig 2		TDDConi.s.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1
RMCCORES	Config 1		CCR.3.1 TDD
ET			CCR.3.3 TDD
Reference	Config 2		CCR.3.1 TDD
Channel			CCR.3.3 TDD
SSB	Config 1		SSB.1 FR2
Configuratio	Config 2		SSB.1 FR2
n SMTC	Config 1		SMTC.1
Configuratio	Config 2	- 	SMTC.1
n	9 =		S S
PDSCH/PD	Config 1		120 KHz
CCH subcarrier spacing	Config 2		120 KHz

CSI-RS for	Config 1, 2		Resource #4 in TRS.2.1 TDD
RLM	Corning 1, 2		Resource #4 in TRS.2.1 TDD
TRS configura	ation		TRS.2.1 TDD
			TRS.2.2 TDD
	tion for PDCCH#1/PDSCH		TCI.State.2
	tion for PDCCH#2		TCI.State.3
OCNG param	eters		OP.1
CP length			Normal
Correlation MacConfiguration	atrix and Antenna		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern II			gp0
Layer 3 filterin	g		Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for	Config 1		CSI-RS.3.1 TDD
CSI	Config 2		CSI-RS.3.1 TDD
reporting			
<u>T1</u>		S	0.2
T2		S	0.2
T3		<u> </u>	1.64
T4		S	0.2 1.88
T5		S	1.00
T5 D1		S	1.84

ETSI

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

Para	ameter	Unit			Test 1			
			T1	T2	Т3	T4	T5	
AoA setup			Setup TBD defined in A.3.15					
PDCCH_beta		dB		•	4			
PDCCH_DMRS	S_beta	dB			4			
PBCH_beta		dB						
PSS_beta		dB						
SSS_beta		dB			0			
PDSCH_beta		dB						
OCNG_beta		dB						
SNR on RLM-RS1	Config 1, 2	dB	2	-6	-15	-4.5	2	
SNR on RLM-RS2	Config 1, 2	dB	2	-14	-15	-15	-14	
SNR on other channels and signals dB			•	2	•			
N_{oc}	Config 1, 2	dBm/15KHz	-104.7					
Propagation co	ndition		[TDL-A 30ns 75Hz]					

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.5.5.1.8.1-3A: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

	Field	Test 1	
	Field		
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is	

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

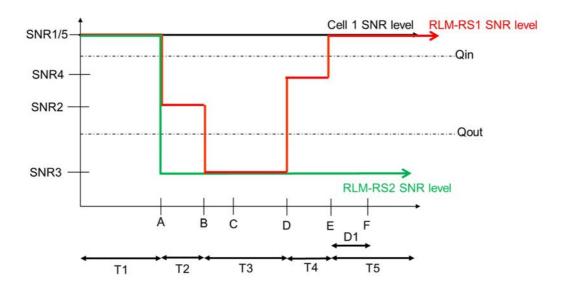


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

Co	nfiguration	Description
1		FDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex
		mode
2		TDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex
		mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations.

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1, 2	1 and 2	1 for NR PSCell and 2 for LTE PCell
SSB configuration		1, 2	SSB.1 FR2	
SMTC configuration		1, 2	SMTC	
			pattern 1	
DRX cycle length	S	1, 2	OFF	
T1	S	1, 2	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Cell 2	
AoA setup		1, 2	Setup 3 defined in A.3.15.3	
·		·	AoA1	AoA2
TDD configuration		1, 2	TDDC	onf.3.1
PDSCH RMC		1, 2 1, 2	SR.3.1 TDD	Not sent
configuration				
RMSI CORESET		1, 2	CR.3.1	Not sent
RMC configuration				
Dedicated CORESET		1, 2	CCR.3.2	Not sent
RMC configuration				
TRS configuration		1, 2 1, 2	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1, 2	TCI.State.2	Not sent
state				
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1	Not sent
Initial DL BWP		1, 2	DLBW	/P.0.1
configuration				
Initial UL BWP configuration		1, 2	ULBW	/P.0.1
RLM-RS		1, 2	SSB with index	SSB with index
		,	0	1
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	3	N/A
N_{oc} Note2	dBm/SCS	1, 2	-84.9	Not sent
\hat{E}_s/N_{oc}	dB	1, 2	3	N/A
SS-RSRP Note3	dBm/SCS	1, 2	-81.9	-81.9
lo	dBm/95.04 MHz	1, 2 1, 2	-51.15	-52.91
Propagation Condition		1, 2	AWGN	-

A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.5.5.2 Interruption

A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.1.1-1.

The general test parameters are given in Table A.5.5.2.1.1-2, and NR cell specific test parameters are given in Table A.5.5.2.1.1-3 and A.5.5.2.1.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.1.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there

are two cells: Cell1 and Cell2. Cell1 is LTE PCell on and Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations

Table A.5.5.2.1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.4	DRX related parameters are defined in
		DKA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	s	10	

Table A.5.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Paramet	er	Unit	Cell 2
Frequency Range	Frequency Range		FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to PD EPRE ratio of PDSCH DMR	H DMRS S to SSS CCH DMRS	dB	0
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Ês/N _{oc}		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

	Parameter	Unit	Cell2		
Angle of	ngle of arrival configuration Setup 1 according to clause A.3.				
$N_{oc}^{}$ Note1		dBm/15kHz ^{Note4}	-112		
N_{oc} Note1	1	dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_o	с	dB	17		
SS-RSRP ^{Note2} dBm/SCS ^{Note4} -85.97			-85.97		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:			ot specified in the test is assumed to be nodelled as AWGN of appropriate power		
	for N_{oc} to be fulfille	d.			
Note 2:	2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:	3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone		

Table A.5.5.2.1.1-5: Void

A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.2 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.5.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.2.1-1.

The general test parameters are given in Table A.5.5.2.2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.2.1-3 and A.5.5.2.2.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.2.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH

indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.6	DRX related parameters are defined in Table A.3.3.6-1
Measurement gap pattern Id		OFF	
T1	S	10	

Table A.5.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Paramet	ter	Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to PE EPRE ratio of PDSCH DMR EPRE ratio of PDSCH DMR	CH DMRS S to SSS DCCH DMRS S to SSS S to SSS DSCH	dB	0
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Ê _s /N _{oc}		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		ms	3
Nete 4 CONO electric	a command according the art hand		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

	Parameter	Unit	Cell2			
Angle of	arrival configuration		Setup 1 according to clause A.3.15.1			
$N_{oc}^{}$ Note1		dBm/15kHz ^{Note4}	-112			
Noc Note1		dBm/SCS ^{Note3}	-102.97			
\hat{E}_s/N_{od}	c	dB	17			
SS-RSRI	DNote2	dBm/SCS Note4	-85.97			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17			
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90			
Note 1:		rriers and time and shall be n	ot specified in the test is assumed to be nodelled as AWGN of appropriate power			
	00					
Note 2:	Note 2: SS-RSRP and lo levels have been derived from other parameters for information					
Note 3:	SS-RSRP minimum	poses. They are not settable parameters themselves. RSRP minimum requirements are specified assuming independent interference and see at each receiver antenna port.				
Note 4:	Equivalent power red	quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone			

Table A.5.5.2.2.1-5: Void

A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.3 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.5.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-2. In the test there are three cells: Cell1 Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 is NR FR2 PSCell and NR FR2 deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.3.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

	Config	Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only i	required to be tested in one of the supported test configurations

Table A.5.5.2.3.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	Ms	640	
T1	S	10	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	eter	Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
		1		
Duplex mode	Config 1,2		TDD	TDD
•				
		1 -		
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP				
Configuration	Config 1,2		DLBWP.0.1	DLBWP.0.1
Downlink dedicated	Carfin 4.0		DI DIVID 4.4	DI DWD 4.4
BWP Configuration	Config 1,2		DLBWP.1.1	DLBWP.1.1
Uplink initial BWP	Config 1,2		ULBWP.0.1	ULBWP.0.1
configuration	Corning 1,2		OLBVVF.U.1	OLDWF.U.1
Uplink dedicated BWP	Config 1,2		ULBWP.1.1	ULBWP.1.1
configuration			<u> </u>	
PDSCH Reference	Config 1,2		SR.3.1 TDD	-
measurement channel RMSI CORESET	<u> </u>	+		
Reference Channel	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET				
parameters	Config 1,2		CCR 3.1 TDD	CCR 3.1 TDD
OCNG Patterns			OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
TRS configuration	Config 1,2	+	TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS	Corning 1,2	+	TOI.State.0	TCI.State.0
EPRE ratio of PBCH DMRS	S to SSS	1		
	EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS		1		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0
EPRE ratio of PDSCH DMRS to SSS]		
	EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)		1		
EPRE ratio of OCNG to OCNG DMRS (Note 1)			A14/ON I	111/01/
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	3	3
Time offset to cell1 Note 3		μs	-	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.3.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Para	ameter	Unit	Cell 2	Cell 3
Angle of arrival configuration			Setup 1 defined i	n clause A.3.15.1
Note1	NR_TDD_FR2_A			
IV oc	NR_TDD_FR2_B	dBm/15kHz	-112	-105
	NR TDD FR2 F			

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

	T			
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{\rm Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	-103	-96
	NR_TDD_FR2_G	3	-103	-90
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
SS-RSRPNote2	NR_TDD_FR2_F	dBm/SCS	-86	0.0
33-K3KP110102	NR_TDD_FR2_G	Note4	-80	-86
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B		17	10
f: /r	NR_TDD_FR2_F	٦D		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	NR_TDD_FR2_G	dB		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{N}_{\mathrm{oc}}$	NR_TDD_FR2_F	JD.	17	10
$E_{\rm s}/N_{\rm oc}$	NR_TDD_FR2_G	dB		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04	50.4	50.4
IO ^{NOTE2}	NR_TDD_FR2_G	MHz Note4	-59.4	-59.4
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be				
constant over subcarriers and time and shall be modelled as AWGN of appropriate power				
	to be fulfilled			• • •

for $N_{\it oc}$ to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

SS-RSRP minimum requirements are specified assuming independent interference and Note 3: noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the guiet zone

As observed with 0dBi gain antenna at the centre of the quiet zone Note 5:

A.5.5.2.3.2 **Test Requirements**

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-1 and Table A.5.5.2.3.2-2.

Table A.5.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

	μ	NR Slot length (ms)	Interruption length (slot)
ſ	3	0.125	4

Table A.5.5.2.3.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe for synchronous interband EN-DC.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.4.1-1.

The general test parameters are given in Table A.5.5.2.4.1-2, and NR cell specific test parameters are given in Table A.5.5.2.4.1-3 and A.5.5.2.4.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-2. In the test there are three cells: Cell1 Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 is NR FR2 PSCell and NR FR2 deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.4.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

Config		Description	
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
•				
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP			·	
Configuration	Config 1,2		DLBWP	.0.1
Downlink dedicated	0 " 10		DI DIAID	
BWP Configuration	Config 1,2		DLBWP	.1.1
Uplink initial BWP	Config 1.0		LIL DW/D	0.1
configuration	Config 1,2		ULBWP	.0.1
Uplink dedicated BWP	Config 1,2		ULBWP	1 1
configuration	Coming 1,2		92BW	1
PDSCH Reference	Config 1,2		SR.3.1 TDD	_
measurement channel				
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
Reference Channel	3 ,			
PDCCH CORESET	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD
parameters	J J ,			00.4
OCNG Patterns	1		OP.1	OP.1
SSB Configuration			SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS		_		
EPRE ratio of PBCH DMR		-		
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS		1		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0
EPRE ratio of PDSCH DMRS to SSS			o	U
EPRE ratio of PDSCH to PDSCH		1		
EPRE ratio of OCNG DMRS to SSS(Note 1)		1		
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		ms	3	3
Time offset to cell1 Note 3		μs	-	3
Note 1: OCNG shall be used such that het			-11	. (- 1 . () ((1

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parai	meter	Unit	Cell 2	Cell 3
Angle of arrival config	guration		Setup 1 defined i	n clause A.3.15.1
λ/ Note1	NR_TDD_FR2_A			
IV oc	NR_TDD_FR2_B	dBm/15kHz	-112	-105
	NR_TDD_FR2_F			

NR_TDD_FR2_G				
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc} Note1	NR_TDD_FR2_F	dBm/SCS ^{Note}	-103	-96
	NR_TDD_FR2_G	3	-103	-90
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			-86
SS-RSRPNote2	NR_TDD_FR2_F	dBm/SCS	-86	
00-100101	NR_TDD_FR2_G	Note4		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
$\hat{f E}_{ m s}/{ m I}_{ m ot}$		dB	17	10
$\hat{E}_{\rm s}/N_{\rm oc}$		dB	17	10
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-59.4	-59.4
10	NR_TDD_FR2_G	MHz Note4	-39.4	-59.4
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
Note 1: Interference from other cells and noise sources not specified in the test is assumed to				
constant over subcarriers and time and shall be modelled as AWGN of appropriate power				
for N_{oc} to	for N_{oc} to be fulfilled.			
Note 2: SS-RSRP	Note 2: SS-RSRP and lo levels have been derived from other parameters for information			

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-1 and Table A.5.5.2.4.2-2.

Table A.5.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.4.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

The general test parameters are given in Table A.5.5.2.5.1-2, and NR cell specific test parameters are given in Table A.5.5.2.5.1-3 and A.5.5.2.5.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-2. In the test there are three cells: Cell1 Cell2 and Cell3. Cell1 and Cell3 is LTE PCell and LTE deactivated SCell, Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE is or	The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.2.5.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and two is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Paramet	ter	Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Confid 1.2		CCR.3.1 TDD
OCNG Patterns	OCNG Patterns		OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC	CH DMRS		
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			AVVOV
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.5.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

	Parameter	Unit	Cell2	
Angle of	arrival configuration		Setup 1 according to clause A.3.15.1	
$N_{oc}^{}$ Note1		dBm/15kHz ^{Note4}	-112	
N_{oc} Note1		dBm/SCS ^{Note3}	-102.97	
\hat{E}_s/N_{od}	c	dB	17	
SS-RSRI	DNote2	dBm/SCS Note4	-85.97	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17	
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90	
Note 1:		rriers and time and shall be n	ot specified in the test is assumed to be nodelled as AWGN of appropriate power	
	00			
Note 2:		rels have been derived from other parameters for information		
purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independence noise at each receiver antenna port.				
Note 4:	Equivalent power red	ceived by an antenna with 0dBi gain at the centre of the quiet zone		
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone	

A.5.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.5.2-1 and Table A.5.5.2.5.2-2.

Table A.5.5.2.5.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.5.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.6 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.5.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.6.1-1.

The general test parameters are given in Table A.5.5.2.6.1-2, and NR cell specific test parameters are given in Table A.5.5.2.6.1-3 and A.5.5.2.6.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-2. In the test there are three cells: Cell1 Cell2 and Cell3. Cell1 and Cell3 is LTE PCell and LTE deactivated SCell, Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations	

Table A.5.5.2.6.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and two is E-UTRAN RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Paramet	er	Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1.2		CCR.3.1 TDD
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS	to SSS		
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			
	NG DIVIKO (NOTE 1)		A/A/GNI
Propagation Condition		ms	AWGN
Time offset to cell 1 Note 2	Time offset to cell1 Note 2		3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

	Parameter	Unit	Cell2	
Angle of	arrival configuration		Setup 1 according to clause A.3.15.1	
$N_{oc}^{}$ Note 1		dBm/15kHz ^{Note4}	-112	
Noc Note1		dBm/SCS ^{Note3}	-102.97	
\hat{E}_s/N_{od}	c	dB	17	
SS-RSRI	DNote2	dBm/SCS Note4	-85.97	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17	
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90	
Note 1:	constant over subca	rriers and time and shall be n	ot specified in the test is assumed to be nodelled as AWGN of appropriate power	
	for N_{oc} to be fulfille			
Note 2:		vels have been derived from other parameters for information		
Note 3:			serves. ssuming independent interference and	
Note 4:			Bi gain at the centre of the quiet zone	
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone	

A.5.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.6.2-1 and Table A.5.5.2.6.2-2.

Table A.5.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.6.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.3 SCell Activation and Deactivation Delay

A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1 except the SCell is in FR2 intraband.

The supported test configurations are shown in table A.5.5.3.1.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.1.1-2 and A.5.5.3.1.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

Table A.5.5.3.1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell

Configuration	Description
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations	

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell

Parameter ^{Note 5}	Unit	Cell 2			Cell 3		
		T1	T2	T3	T1	T2	T3

SSB ARFCN		freq1	freq2		
Duplex mode		TDD	TDD		
TDD configuration		TDDConf.3.1	TDDConf.3.1		
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66		
PDSCH Reference measurement channel		SR.3.1 TDD	SR.3.1 TDD		
RMSI CORESET Reference Channel		CR.3.1 TDD	CR.3.1 TDD		
RMC CORESET Reference Channel		CCR.3.1 TDD	CCR.3.1 TDD		
DL initial BWP configuration		DLBW	/P.0.1		
DL dedicated BWP configuration		DLBW	/P.1.1		
UL initial BWP configuration		ULBW	/P.0.1		
UL dedicated BWP configuration		ULBW	/P.1.1		
OCNG Patterns		OP.1			
SMTC configuration		SMTC.1			
SSB configuration		SSB.1 FR2			
TCI state		TCI.State.0			
TRS configuration		TRS.2.1 TDD			
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB		1		
EPRE ratio of PDSCH_DMRS to SSS	ub.		,		
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS ^{Note 1}					
EPRE ratio of OCNG to OCNG DMRS Note					
1					
Propagation conditions AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral					

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral Note 1: density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\it oc}$ to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver

Note 4: antenna port.

Note 5: All parameters apply for configuration 1 and 2

Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

ParameterNote 6	Unit	Cell 2			Cell 3		
Parameter		T1	T2	T3	T1	T2	Т3

Angle of arrival configuration		Setup 1 according to A.3.15.1			
$N_{oc}^{ m Note1}$	dBm/15kHz ^N	-112	-112		
N_{oc} Note1	dBm/SCS ^{Note}	-102.97	-102.97		
\hat{E}_s/N_{oc}	dB	14	14		
SS-RSRPNote2	dBm/SCS Note4	-88.97	-88.97		
\hat{E}_{s}/I_{ot}	dB	14	14		
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-88.80	-88.80		

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: All parameters apply for configuration 1 and 2

A.5.5.3.1.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[T_{SMTC_SCell} + 5ms]$ as defined in clause 8.3.

A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2

Configuration	Description
1	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to pass in one of the supported test configurations

Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit	Cell 2	Cell 3		
SSB ARFCN			T1 T2 T3	T1 T2 T3		
	Config 1,4		freq2 TDD	freq1 FDD		
Duplex mode	Config 2,3,5,6		TDD	TDD		
	Config 1,4			Not Applicable		
TDD configuration	Config 2,5		TDDConf.3.1	TDDConf.1.1		
	Config 3,6			TDDConf.2.1		
	Config 1,4			10: N _{RB,c} = 52		
BW _{channel}	Config 2,5	MHz	100: N _{RB,c} = 66	10: N _{RB,c} = 52		
	Config 3,6			40: N _{RB,c} = 106		
DL initial BWP	Config		DLBWP.0.1			
configuration DL dedicated BWP	1,2,3,4,5,6		2 - 2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -			
configuration	Config 1,2,3,4,5,6		DLB\	WP.1.1		
UL initial BWP	Config		III R\	WP.0.1		
configuration	1,2,3,4,5,6		OLBV	/VF.0.1		
UL dedicated BWP	Config		ULB\	WP.1.1		
configuration	1,2,3,4,5,6		Not Ar	nliaghla		
DRx Cycle	T	ms	Νοι Αμ	pplicable		
PDSCH Reference	Config 1,4			SR.1.1 FDD		
measurement channel	Config 2,5		SR.3.1 TDD	SR.1.1 TDD		
measurement channel	Config 3,6			SR.2.1 TDD		
RMSI CORESET	Config 1,4			CR.1.1 FDD		
Reference Channel	Config 2,5		CR.3.1 TDD	CR.1.1 TDD		
TOTOTOTO OTIGITIES	Config 3,6			CR.2.1 TDD		
RMC CORESET	Config 1,4			CCR.1.1 FDD		
RMC CORESET Reference Channel	Config 2,5		CCR.3.1 TDD	CCR.1.1 TDD		
	Config 3,6]	CCR.2.1 TDD		
OCNG Patterns			OP.1			
SMTC configuration				TC.1		
TCI state	·		TCI.State.0 NA			

	Config 1,4			TRS.1.1 FDD			
TRS configuration	Config 2,5		TRS.2.1 TDD	TRS.1.1 TDD			
	Config 3,6			TRS.1.2 TDD			
SSB configuration	Config 1,2,4,5		SSB.1 FR2	SSB.1 FR1			
SSB configuration	Config 3,6		335.1 FK2	SSB.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5	kHz	120kHz	15kHz			
subcarrier spacing	Config 3,6	KITZ	IZUKHZ	30kHz			
EPRE ratio of PSS to SSS	3						
EPRE ratio of PBCH DMF	RS to SSS						
EPRE ratio of PBCH to PI	EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DN							
EPRE ratio of PDCCH to	PDCCH DMRS	dB	0				
EPRE ratio of PDSCH DN	MRS to SSS						
EPRE ratio of PDSCH to	PDSCH						
EPRE ratio of OCNG DM	RS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
	·		AWGN	NA			
Propagation condition	Propagation condition			Link only, see clause			
				A.3.7A			
Note 1: OCNG shall	Note 1: OCNG shall be used such that both calls are fully allocated and a constant total transmitted power spectral						

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		l lmi4	Cell 2				Cell 3		
		Unit	T1	T2	T3	T1	T2	T3	
Angle of arrival con	nfiguration		Setup 1 according to clause A.3.15.1						
$N_{\it oc}^{\rm Note1}$		dBm/15kHz		-112					
$N_{\it oc}$ Note1	Config 1,2,4,5 Config 3,6	dBm/SCS	-102.97		NA Link only, see claus A.3.7A				
SS-RSRP ^{Note2}	Config 1,2,4,5 Config 3,6	dBm/SCS Note3	-85.97				clause		
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB	17						
\hat{E}_s/I_{ot}		dB 17		17					
IoNote2	Config 1,2,4,5	dBm/ChBw ^N	-56.90		50.00				
10	Config 3,6	ote4,Note6							

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.5.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case.

A.5.5.3.3 Void

A.5.5.3.4 Void

A.5.5.3.5 SCell Activation and deactivation of SCell in FR2

A.5.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.5.1-1 below. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.5.5.3.5.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment [100ms] after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2. The UE shall be able to report valid CSI for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$ as defined in clause 8.3 provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(m+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms+T_{SMTC_duration}])$ as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot $(n+[T_{HARQ}+3ms])$ as defined in clause 8.3, and any PCell and PSCell interruption due to the deactivation shall occur in the $(n+1+[T_{HARQ}))$ to $(n+1+[T_{HARQ}+3ms])$ as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.5.5.3.5.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

Configuration	Description
1	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
5	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
6	LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.5.5.3.5.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit		Cell 2		Cell 3			
	ter	Offic	T1	T2	Т3	T1	T2	T3	
SSB ARFCN				freq1		freq2			
Duplex mode	Config 1,4			FDD		TDD			
Вирюх пюче	Config 2,3,5,6			TDD			TDD		
	Config 1,4		N	ot Applicat	le				
TDD configuration	Config 2,5		Т	DDConf.1.	1		TDDConf.3	3.1	
	Config 3,6		Т	DDConf.2.	1				
	Config 1,4		1	0: N _{RB,c} = 5	52				
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52 40: N _{RB,c} = 106			100: N _{RB,c} = 66			
	Config 3,6								
	Config 1,4		10: N _{RB,c} = 52						
BWP BW	Config 2,5			10: N _{RB,c} = 52			100: N _{RB,c} = 66		
	Config 3,6		40: N _{RB,c} = 106						
DRx Cycle		ms	Not Applicable						
PDSCH Reference	Config 1,4		SR.1.1 FDD						
measurement channel	Config 2,5			SR.1.1 TDD		SR.3.1 TDD			
measurement channel	Config 3,6			SR.2.1 TDD					
RMSI CORESET	Config 1,4			CR.1.1 FDD					
Reference Channel	Config 2,5			CR.1.1 TDD			CR.3.1 TD	D	
Reference Channel	Config 3,6			CR.2.1 TDD		1			
DMO CODECET	Config 1,4		(CR.1.1 FDI)				
RMC CORESET Reference Channel	Config 2,5		(CR.1.1 TDI)		CCR.3.1 TE	DD	
	Config 3,6		CCR.2.1 TDD						
OCNG Patterns			OF		P.1				
SMTC configuration			SM		ITC.1				
TCI state				NA			TCI.State	.0	
TRS configuration	Config 1,4		Т	RS.2.1 TD	D	•	TRS.2.1 TI	OD	

	Config 2,5		TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	
CCD configuration	Config 1,2,4,5		SSB.1 FR1	CCD 4 FDC
SSB configuration	Config 3,6		SSB.2 FR1	SSB.1 FR2
PDSCH/PDCCH	Config 1,2,4,5	Id Ia	15 kHz	120 141 =
subcarrier spacing	Config 3,6	kHz	30 kHz	120 kHz
EPRE ratio of PSS to SSS	3			
EPRE ratio of PBCH DMF	RS to SSS			
EPRE ratio of PBCH to Pl	BCH DMRS			
EPRE ratio of PDCCH DN	MRS to SSS			
EPRE ratio of PDCCH to	PDCCH DMRS	dB	()
EPRE ratio of PDSCH DN	IRS to SSS			
EPRE ratio of PDSCH to	PDSCH			
EPRE ratio of OCNG DMI	RS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
			N/A	
Propagation condition		-	Link only, see clause AWGN	
, 5			A.3.7A	-

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ce} to be fulfilled.
- Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit		Cell 2		Cell 3		
		Offic	T1	T2	T3	T1	T2	Т3
Angle of arrival configuration			NA		Setup 1 according to clause A.3.15.1			
$N_{oc}^{ m Note1}$		dBm/15kHz					-112	
$N_{oc}^{ m Note1}$	Config 1,2,4,5 Config 3,6	dBm/SCS				-102.97		
SS-RSRP ^{Note2}	Config 1,2,4,5 Config 3,6	dBm/SCS Note3 NA		-85.97				
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB	Link only, see clause A.3.7A			17		
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		dB			17			
Io ^{Note2}	Config 1,2,4,5	dBm/ChBw					-56.90	
10	Config 3,6	Note4,Note6					-30.90	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.5.5.3.5.2 Test Requirements

The test requirements defined in clause A.5.5.3.5.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [TBD* T_{SMTC_SCell} +5 ms] as defined in clause 8.3.

A.5.5.4 Void

A.5.5.5 Beam Failure Detection and Link recovery procedures

A.5.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q₀ configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candicate set q₁. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.1.1-1, A.5.5.5.1.1-2, A.5.5.5.1.1-3 and A.5.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.5.5.5.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description						
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					
2 LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth						
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active E-UTRA PCe	II		Cell 1	
E-UTRA RF Channe	el Number		1	
Active PCell			Cell 2	
RF Channel Numbe	r		2	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration				
DL dedicated	Config 1, 2		DLBWP.1.1	
BWP configuration				
UL initial BWP	Config 1, 2		ULBWP.0.1	
configuration				
UL dedicated	Config 1, 2		ULBWP.1.1	
BWP configuration				
TDD Configuration	Config 1, 2		TDDConf.3.1	

	CORESET Config 1, 2			CR. 3.1 TDD	
Referen					
Channel		2 0 1 2			
SSB Co	nfiguration	Config 1, 2		SSB.1 FR2	
SMTC		Config 1, 2		SMTC.3	
Configu	ation	001111g 1, 2		S.W.1 G.15	
PDSCH/		Config 1, 2		120 KHz	
subcarri	er spacing				
PRACH		Config 1, 2		Table A.3.8.3.4	
Configu	ation				
SSB ind	ex assigned	as BFD RS (q ₀)		0	
OOD IIIG	cx assigned	23 DI D 110 (qu)		ŭ	
SSB ind	ex assigned	as CBD RS (q ₁)		1	
		Γ .			
TCI Con	figuration	Config 1, 2		TBD	
OCNC *				OP.1	
CP leng	arameters			Normal	
Correlat	ion Matrix ai	ad Antonno		2x2 Low	
Configur		iu Antenna		ZXZ LOW	
Beam	DCI forma	+		1-0	
failure		Control OFDM		2	
detecti	symbols	CONTROL OF DIVI		2	
on	Aggregation	on level	CCE	8	
transm		pothetical	dB	0	
ission	PDCCH R	E energy to		ŭ	
param		SI-RS RE energy			
eters		0,			
	Ratio of hy	pothetical	dB	0	
	PDCCH D	MRS energy to		-	
		SI-RS RE energy			
	DMPS pre	coder granularity		REG bundle size	
	-	-		_	
DDV	REG bund	lle size		6	
DRX				OFF	
Gap pat		- T b b - b-l		gp0	MATIN THE STATE OF
riminSyr	ncOutOfSyn	c i nresnoia		absent	When the field is
					absent, the UE
					applies the value 0. (Table 8.1.1-1).
rsrn-Thr	rsrp-ThresholdSSB		dBm	TBD	Threshold used for
131P-1111	151p-1111e511010555			100	Qout_LR_SSB
powerControlOffsetSS			db0	Used for deriving	
para. Carmoronocco			220	rsrp-ThresholdCSI-	
				RS	
beamFa	ilureInstance	eMaxCount		n1	see TS 38.321 [7],
					clause 5.17
beamFa	ilureDetection	onTimer		pbfd4	see TS 38.321 [7],
					clause 5.17

CSI-RS configuration for CSI reporting	Config 1, 2		[CSI-RS.3.1 TDD]	
TCI states			[TCI.State.0]	
CSI-RS for tracking	Config 1, 2		[TRS.2.1 TDD]	
SSB index assigned as RI	_M RS		0, 1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	2.61	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup TE	3D defined	in A.3.15	
EPRE ratio of PDCCH DM	IRS to SSS	dB					
EPRE ratio of PDCCH to I	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	}	dB	0				
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to F	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
CNID CCD of cot a		dB	-12	-12	5	5	5
SNR_SSB of set q ₁ Config 2		UD	-12	-12	5	5	5
N_{oc}	dBm/12	TBD					
1 voc	Config 2	0 KHz	TBD				

Propagation condition TDL-A 30ns 75Hz			TDL-A 30ns 75Hz		
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total				
	transmitted power spectral density				
Note 2:	The uplink resources for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configuration of time period T1.	ration for C	SI reporting are assigned to the UE prior to the start		
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.				
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.				
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.				
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.				
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.1.1-1.				
Note 9:			E which supports 2RX on at least one band. For nds, the SNR during T3 is modified as specified in		

Table A.5.5.5.1.1-4: Measurement gap configuration for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

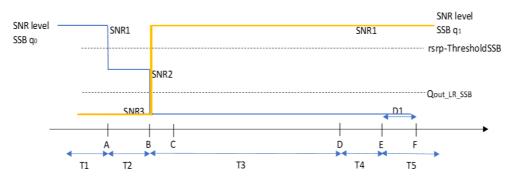


Figure A.5.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [960+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in DRX mode

A.5.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.2.1-1, A.5.5.5.2.1-2, A.5.5.5.2.1-3, A.5.5.5.2.1-4 and A.5.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q₀ in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q₁ of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCSell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.2.1-1: Supported test configurations for FR2 PSCell

Configuration Description						
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					
2	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.5.2.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Param	neter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCe	II		Cell 1	
E-UTRA RF Channe	el Number		1	
Active PCell			Cell 2	
RF Channel Number	•		2	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	

CORES	ET	Config 1		CR. 3.1 TDD	
Referen					
	nfiguration	Config 1, 2		SSB.3 FR2	
SMTC Configur	ration	Config 1, 2		SMTC.3	
	/PDCCH er spacing	Config 1, 2		120 KHz	
PRACH Configur	ration	Config 1, 2		Table A.3.8.3.4	
SSB ind	ex assigned	l as BFD RS (q₀)		0	
SSB ind	ex assigned	l as CBD RS (q ₁)		1	
	figuration	Config 1, 2		TBD	
OCNG r	arameters			OP.1	
CP leng	th			Normal	<u> </u>
	ion Matrix a	nd Antenna		2x2 Low	
Configur		na / intornia		ZXZ Z511	
Beam	DCI forma	ıt		1-0	
failure detecti	Number of symbols	f Control OFDM		2	
on	Aggregation	on level	CCE	8	
transm ission param eters	PDCCH R	ypothetical E energy to SI-RS RE energy	dB	0	
	PDCCH D	ypothetical MRS energy to SI-RS RE energy	dB	0	
	DMRS pre	ecoder granularity		REG bundle size	
	REG bund	dle size		6	
DRX				DRX.3	A.3.3.3
Gap pat				N.A.	
rlmlnSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).	
rsrp-Thr	rsrp-ThresholdSSB		dBm	TBD	Threshold used for Qout_LR_SSB
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS	
beamFa	ilureInstanc	eMaxCount		n1	see TS 38.321 [7], clause 5.17
beamFa	ilureDetection	onTimer		pbfd4	see TS 38.321 [7], clause 5.17

CSI-RS configuration for CSI reporting	Config 1, 2		[CSI-RS.3.1 TDD]	A.3.14.2
TCI states			[TCI.State.0]	
CSI-RS for tracking	Config 1, 2		[TRS.2.1 TDD]	
SSB index assigned as RI	M RS		0, 1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	3.37	
T3		S	2.8	
T4		S	0	
T5		S	0.61	
D1		S	0.57	
Note 1: UE-specific PD	CCH is not tran	nsmitted afte	er T1 starts.	

Table A.5.5.5.2.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parame	Unit	Test 1						
			T1	T2	Т3	T4	T5	
AoA setup				Setup TE	3D defined	in A.3.15		
EPRE ratio of PDCCH D	MRS to SSS	dB						
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DM	IRS to SSS	dB						
EPRE ratio of PBCH to F	PBCH DMRS	dB						
EPRE ratio of PSS to SSS		dB	0					
EPRE ratio of PDSCH D	EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to	PDSCH DMRS	dB						
EPRE ratio of OCNG DN	/IRS to SSS	dB						
EPRE ratio of OCNG to	OCNG DMRS	dB						
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12	
	Config 2	иь	5	-3	-12	-12	-12	
SNIP SSP of oot a	Config 1	dB	-12	-12	5	5	5	
SNR_SSB of set q ₁	Config 2	uв	-12	-12	5	5	5	
N _{oc} Config 1		dBm/12	TBD					
1 voc	Config 2 0 KHz TBD							
Propagation condition				TDI	A 30ns 7	5Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.5.5.5.2.1-4: Void

Table A.5.5.5.2.1-5: Void

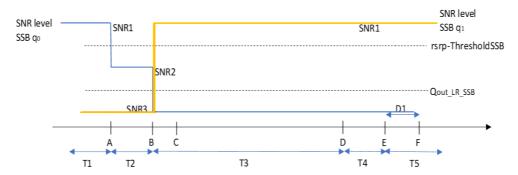


Figure A.5.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [560+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.5.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure.

Figure A.5.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.5.5.5.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.5.3.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Param	eter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel	Number		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET	Config 1		CR.3.1 TDD	A.3.1.2
Reference Channel				
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing	3		_	
csi-RS-Index assigned	d as beam failure		0	
detection RS in set qo				
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	-
Correlation Matrix and	l Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM		_	
parameters	symbols			
	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical	GB.		
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical	45		
	PDCCH DMRS			
	energy to			
	average CSI-			
	RS RE energy			
	DMRS		REG bundle size	
	precoder		TALO DUTINIO SIZO	
	granularity			

	REG bundle		6	
	size		O	
DRX	3126		OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned	as candidate		1	
beam detection RS in				
rlmInSyncOutOfSyncT			absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
-				for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving
				rsrp-
				ThresholdCSI-RS
beamFailureInstanceM	laxCount		n1	see TS 38.321
				[7], clause 5.17
beamFailureDetection ⁻	Timer		pbfd4	see TS 38.321
	T 2			[7], clause 5.17
CSI-RS configuration	Config 1		CSI-RS.3.2 TDD	A.3.14.2
for q ₀ and q ₁	0		001 00 0 4 TDD	10110
CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
for CSI reporting csi-RS-Index	Config 1		CSI-RS.3.2 TDD	A.3.14.2
assigned as RLM RS	Coning		COI-NO.3.2 TDD	A.3.14.2
T310 Timer		ms	1000	
N310		1113	2	
T1		s	1	During this time
		J	•	the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	1.17	
T3		S	0.9	
T4		S	0	
T5		S	0.31	
D1		S	0.27	
Note 1: UE-specific	PDCCH is not tra	nsmitted afte	r T1 starts.	

Table A.5.5.5.3.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Paramete	er	Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup TI	3D defined	in A.3.15	
EPRE ratio of PDCCH DN	IRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB			0		
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set qo	Config 1	dB	5	-3	-12	-12	-12
SNR CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5

N_{oc}		Config 1	dBm/15 KHz	TBD	
	Propagation condition TDL-A 30ns 75Hz				
Note 1:	OCNG shall be u	used such that the	resources	in Cell 1 are fully allocated and a constant total	
	transmitted power	er spectral density	is achieve	ed for all OFDM symbols.	
Note 2:	The uplink resou	rces for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.	
Note 3:	NZP CSI-RS res	ource set configu	ration for C	SI reporting are assigned to the UE prior to the start	
	of time period T1.				
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.				
Note 5:	The timers and I	ayer 3 filtering rela	ated param	eters are configured prior to the start of time period	
	T1.				
Note 6:	The signal conta	ins PDCCH for U	Es other th	an the device under test as part of OCNG.	
Note 7:	SNR levels corre	espond to the sign	al to noise	ratio over the SSS REs.	
Note 8:				T5 is denoted as SNR1, SNR2 and SNR3	
	respectively in figure A.5.5.5.3.1-1.				
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For				
	testing of a UE v	vhich supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in	
	clause [A.3.6].				

Table A.5.5.5.3.1-4: Void

Table A.5.5.5.3.1-5: Void

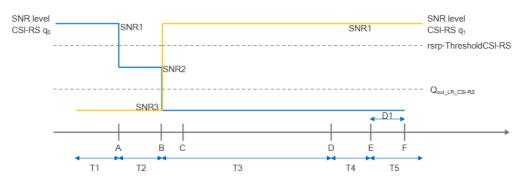


Figure A.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.5.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.5.4.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parame	ter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel N	umber		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference	Config 1		CR.3.1 TDD	A.3.1.2
Channel				
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing				
csi-RS-Index assigned a	as beam failure		0	
detection RS in set q ₀				
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna			2x2 Low	
Configuration				
	DCI format		1-0	

Beam failure detection	Number of		2	
transmission	Control OFDM			
parameters	symbols			
'	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical	ub.	Ö	
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	٩D	0	
		dB	0	
	hypothetical			
	PDCCH DMRS			
	energy to			
	average CSI-			
	RS RE energy		DE0 ! " '	
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
csi-RS-Index assigned a	s candidate		1	
beam detection RS in se	et q ₁			
rlmInSyncOutOfSyncTh			absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
Torp TimedridiaeeB		abiii	122	for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving
powercontrolonsetoo			abo	rsrp-
				ThresholdCSI-RS
beamFailureInstanceMa	vCount		n1	see TS 38.321
Deamrailuremstanceivia	XCount		111	
h a a ma Failt was Data atia m Ti			- L- f - l A	[7], clause 5.17
beamFailureDetectionTi	mer		pbfd4	see TS 38.321
001.00	10 " 1		001 00 0 0 TDD	[7], clause 5.17
CSI-RS configuration	Config 1		CSI-RS.3.2 TDD	A.3.14.2
for q ₀ and q ₁				
CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
for CSI reporting				
csi-RS-Index assigned	Config 1		CSI-RS.3.2 TDD	A.3.14.2
as RLM RS				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time
				the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	5.43	
T3		S	5.16	
T4		S	0	
T5				
		S	0.31	
D1	DCCI Lia+ +	S sitted often	0.27	
Note 1: UE-specific P	DCCH is not trans	milled allei	า า รเสทร.	

Table A.5.5.5.4.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter			Unit	Test 1				
				T1	T2	Т3	T4	T5
AoA setu	р				Setup TE	BD defined	in A.3.15	
EPRE ra	tio of PDCCH DM	RS to SSS	dB					
EPRE ra	tio of PDCCH to P	DCCH DMRS	dB					
EPRE ra	tio of PBCH DMR	S to SSS	dB					
EPRE ra	tio of PBCH to PB	CH DMRS	dB					
EPRE ra	tio of PSS to SSS		dB			0		
EPRE ra	tio of PDSCH DMI	RS to SSS	dB					
EPRE ra	tio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS			dB					
EPRE ra	tio of OCNG to OC	CNG DMRS	dB					
SNR_CS	I-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CS	I-RS of set q ₁	Config 1	dB	-12	-12	5	5	5
N_{oc}		Config 1	dBm/15			TBD		
¹ voc			KHz					
Propagat	ion condition					A 30ns 7		
Note 1:		used such that the					a constant t	otal
	transmitted pow	er spectral density	/ is achieve	ed for all OF	FDM symbo	ls.		
Note 2:	The uplink resou	urces for CSI repo	rting are as	ssigned to t	he UE prior	to the star	t of time pe	riod T1.
Note 3:	Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start							
	of time period T1.							
Note 4:								
Note 5:	The timers and I T1.	ayer 3 filtering rela	ated param	neters are c	onfigured p	rior to the s	start of time	period
Note 6:	The signal conta	ains PDCCH for U	Es other th	an the devi	ce under te	st as part o	of OCNG.	

- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.5.5.5.4.1-4: Void

Table A.5.5.5.4.1-5: Void

Table A.5.5.5.4.1-6: Void

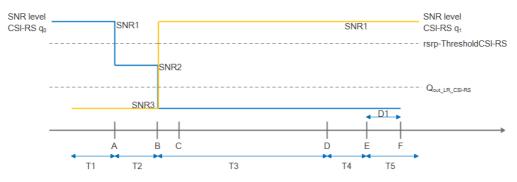


Figure A.5.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.5.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.5 EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements for SSB based beam failure detection and link recovery for an FR2 serving cell in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.5.5.5.5.1-1, A.5.5.5.5.1-2 and A.5.5.5.5.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.5.1-3 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.5.1-3 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.5.5.5.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.5.5.5.5.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parame	ter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Numb	oor		1	
Active PSCell) C I		Cell 2	
RF Channel Number			2	
Duplex mode	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration	Coming 1, 2		DLBWF.U.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
CORESET Reference Channel	Config 1,2		CR. 3.1 TDD	
SSB Configuration	Config 1,2		SSB.1 FR2	
SMTC Configuration	Config 1,2		SMTC.1	
PDSCH/PDCCH	Config 1,2		120 KHz	
subcarrier spacing			_	
SSB index assigned as BF			0	
SSB index assigned as CB	DRS (q ₁)		1	
TRS configuration			TRS.2.1 TDD	
TCI configuration			TCI.State.0	
OCNG parameters			OP.1 Normal	
CP length Correlation Matrix and Ante	onna Configuration		2x2 Low	
Correlation Matrix and Artic			_	
	DCI format		1-0	
Beam failure detection	Number of Control OFDM symbols		2	
transmission parameters	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to average CSI-RS RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS			
	energy to average CSI-RS RE energy			
	DMRS precoder		REG bundle size	
	granularity REG bundle size		6	
DRX	TALO DANGIO SIZO		OFF	DRX is not in use
Gap pattern ID			N.A.	No measurement gap
and Inday			_	pattern is configured
ssb-Index			2	Number of SSB indexes used for beam failure
				detection
rlmInSyncOutOfSyncThres	hold		absent	When the field is absent,
				the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	[-94.5]	Threshold used for
				Q _{out_LR_SSB}

powerControlOffsetSS		db0	Used for deriving rsrp- ThresholdCSI-RS	
beamFailureInstanceMaxC		n2	see TS 38.321 [7], clause 5.17	
beamFailureDetectionTime		pbfd4	see TS 38.321 [7], clause 5.17	
CSI-RS Configuration for reporting			CSI-RS.3.1 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the UE shall be fully synchronized to cell 1
T2		S	2.6	
T3	S	1.64		
T4	S	0		
T5	S	1.01		
D1	S	0.97		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.5.5.5.5.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1					
			T1	T2	Т3	T4	T5	
AoA setup			Setup 1 defined in A.3.15					
EPRE ratio of PDCCH D	MRS to SSS	dB						
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DM	IRS to SSS	dB						
EPRE ratio of PBCH to I	PBCH DMRS	dB						
EPRE ratio of PSS to SS	SS	dB	0					
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12	
	Config 2	uБ	5	-3	-12	-12	-12	
SNR_SSB of set q ₁	Config 1	dB	-12	-12	5	5	5	
	Config 2	T UB	-12	-12	5	5	5	
λ/ Config 1		dBm/15	-104.7					
N_{oc}	Config 2	KHz	-104.7					

Propagation condition			TDL-A 30ns 75Hz			
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total					
	transmitted power spectral density is achieved for all OFDM symbols.					
Note 2:		The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.				
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start					
	of time period T1.					
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.					
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period					
	T1.					
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.					
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.					
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3					
	respectively in figure A.5.5.5.1-1.					
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For					
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in					
	clause [A.3.6].					

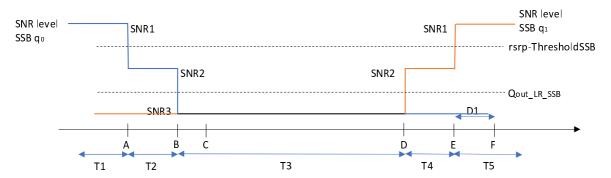


Figure A.5.5.5.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.5.5.6 Active BWP switch

A.5.5.6.1 DCI-based and Timer-based Active BWP Switch

A.5.5.6.1.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.5.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.6.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.6.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted i. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.5.5.6.1.1.1-1: DL BWP switch supported test configurations

	Config	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	ote 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	A UE which fulfils the requirements in test case A.5.5.2.2 can skip the test cases in A.5.5.2.1.				

Table A.5.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		-	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	u D	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	מם	o	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.5.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.1.1.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2			
Angle of arrival configuration		Setup 1 according to clause			
		A.3.15.1			
N _{oc} Note 1	dBm/15	-112			
	kHz				
Noc ^{Note 1}	dBm/SCS	-103			
SS-RSRP Note 2	dBm/120	-85			
	kHz Note3				
Ê _s /I _{ot}	dB	18			
lo ^{Note2}	dBm/95.04	-56			
	MHz Note4				
Note 1: Interference from other cells and noise sources not specified in the test is					
assumed to be constant over subcarriers and time and shall be modelled					
AWGN of appropriate power for N_{oc} to be fulfilled.					
Note 2: SS-RSRP and lo levels have been derived from other parameters for					
information purposes. They are not settable parameters themselves.					
Note 3: SS-RSRP minimum requirements are specified assuming independent					
interference and noise at each receiver antenna port.					
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone					
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone.					

A.5.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: whether E-UTRA PCell's interruption test requirement is needed or not depends on whether E-UTRA Pcell's interruption could be tested when PSCell is FR2 cell.

A.5.5.6.1.2 E-UTRAN – NR PSCell FR2 DL active BWP switch with FR2 SCell in non-DRX in synchronous EN-DC

A.5.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.2, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.5.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.5.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.5.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in SCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j immediately after the slot wherein bwp-InactivityTimer timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.5.5.6.1.2.1-1: DL BWP switch supported test configurations

Config		Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	A UE which fulfil	s the requirements in test case A.5.5.6.1.2 can skip the test cases in A.5.5.6.1.1.
Note 3:	NR configuration	is the same for PSCell and SCells.

Table A.5.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		ı	test
NR RF Channel Number		2, 3	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	UD	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	UD	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	s	[0.2]	
T2	S	[0.2]	
T3	s	[0.2]	

Table A.5.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3	
Frequency Range		FF	R2	
Duplex mode		TE)D	
TDD configuration		TDDC	onf.3.1	
BW _{channel}		100 MHz:	N _{RB,c} = 66	
Active BWP ID		1, 2	0	
Initial DL BWP Configuration		DLBWP.0.2	DLBWP.0.2	
Active DL BWP-0 Configuration		NA	DLBWP.0.2	
Active DL BWP-1 Configuration		DLBWP.1.3	NA	
Active DL BWP-2 Configuration		DLBWP.1.1	NA	
Initial UL BWP Configuration		ULBWP.0.2	ULBWP.0.2	
Active UL BWP-0 Configuration		NA	ULBWP.0.2	
Active UL BWP-1 Configuration		ULBWP.1.3	NA	
Active UL BWP-2 Configuration		ULBWP.1.1	NA	
PDSCH Reference measurement channel		SR.3.	1 TDD	
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		OF	P.1	
SSB Configuration	on SSB.1 FR2		1 FR2	
SMTC Configuration		SMT	ГС.1	
TCI State		TRS.2	.1 TDD	
TRS Configuration		TCI.S	tate.0	
Antenna Configuration		1)	(2	
Propagation Condition		AW	GN	
EPRE ratio of PSS to SSS	dB	0	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS]			
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)]			
EPRE ratio of OCNG to OCNG DMRS (Note 1)				

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3.

Table A.5.5.6.1.2.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3		
Angle of arrival configuration		Setup TBD according to clause A.3.15			
N _{oc} Note 1	dBm/15	-112	-112		
	kHz				
SS-RSRP Note 2	dBm/120	-85	-85		
	kHz Note3				
Ê _s /I _{ot}	dB	18	18		
Io ^{Note2}	dBm/95.04	-56	-56		
	MHz Note4				
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over					
subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.					
Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not					

- Note 2: SS-RSRP and to levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone.

A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in Clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of k1 for type 1 and type 2 UE.

A.5.5.6.2 RRC-based Active BWP Switch

A.5.5.6.2.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.5.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.5.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.5.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part configuration.

The UE shall be able to completely receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.5.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations					

Table A.5.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		ľ	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1			
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	GD.	Ŭ	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	

Table A.5.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

	Parameter	Unit	Cell 2			
Frequency Ran	ge		FR2			
Duplex mode	<u> </u>		TDD			
TDD configurat	ion		TDDConf.3.1			
BW _{channel}			100 MHz: N _{RB,c} = 66			
Active BWP ID			1, 2			
Initial DL BWP	Configuration		DLBWP.0.2			
Initial UL BWP Configuration			ULBWP.0.2			
Initial Condition			DLBWP.1.3			
	Configuration					
	Active UL BWP-1		ULBWP.1.3			
	Configuration					
Final	Active DL BWP-1		DLBWP.1.1			
Condition	Configuration					
	Active UL BWP-1		ULBWP.1.1			
	Configuration		_			
	nce measurement channel		SR.3.1 TDD			
RMSI CORESE			CR.3.1 TDD			
	RESET parameters		CCR.3.1 TDD			
OCNG Patterns			OP.1			
SSB Configura			SSB.1 FR2			
SMTC Configu	ration		SMTC.1			
TCI State			TCI.State.0			
TRS Configuration			TRS.2.1 TDD			
Antenna Configuration			1x2			
Propagation Co	ondition		AWGN			
EPRE ratio of PS		dB	0			
	CH DMRS to SSS					
	CH to PBCH DMRS					
	CCH DMRS to SSS					
	CCH to PDCCH DMRS					
EPRE ratio of PC	SCH DMRS to SSS					
	CNG DMRS to SSS(Note 1)					
	CNG to OCNG DMRS (Note 1)					
	IG shall be used such that bo	th cells are full	v allocated and a constant			
	transmitted power spectral de					
	ference from other cells and					
	imed to be constant over sub-					
as AWGN of appropriate power for N _{oc} to be fulfilled.						
	RSRP and lo levels have been					
	mation purposes. They are no					
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2						
	ked with ULBWP.0.2; DLBWI					
	WP.1.3 is linked with ULBWF					
	8.213 [3].					

Table A.5.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

	Parameter	Unit	Cell 2
Angle of arrival	configuration		Setup TBD according to A.3.15
NR_TDD_FR2_A			
IV oc	NR_TDD_FR2_B	dBm/15kHz	-112
	NR TDD FR2 F	1	

		NR TDD FR2 G				
		NR TDD FR2 T	1			
		NR TDD FR2 Y	1			
		NR TDD FR2 A				
		NR TDD FR2 B	1			
N_{oc} Note1	NR_TDD_FR2_F		ID (CCC	102		
oc .		NR_TDD_FR2_G	dBm/SCS	-103		
		NR_TDD_FR2_T	1			
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
SS-RSRI	Note2	NR_TDD_FR2_F	dBm/SCS	-85		
33-K3KI		NR_TDD_FR2_G	Note3	-00		
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
$\hat{E}_{_{s}}/I_{_{ot}}$	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			18		
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
lo ^{Note2}		NR_TDD_FR2_F	dBm/95.04	-56		
10		NR_TDD_FR2_G	MHz Note4	-30		
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
Note 1:				ot specified in the test is		
				e and shall be modelled as		
	AWGN of	appropriate power for	N_{oc} to be fulfille	d.		
Note 2:	SS-RSRP	and lo levels have bee	en derived from a	ther parameters for		
		n purposes. They are not settable parameters themselves.				
		minimum requirements are specified assuming independent				
		e and noise at each re	ceiver antenna p	oort.		
Note 4: Equivalent		t power received by an antenna with 0dBi gain at the centre of the				
	quiet zone					

A.5.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.7 PSCell addition and release delay

A.5.5.7.1 Addition and Release Delay of NR PSCell

A.5.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 of TS 36.133 [15] for the case when the PSCell is unknown by the UE at the time of addition.

Supported test configurations are shown in A.5.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
Note: The UE is onl	y required to be tested in one of the supported test configurations

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Par	ameter	Unit	Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell
Initial	Initial Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold RSRP	dBm	100	Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in clause 9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
PRACH config	PRACH configuration on cell2		FR2 configuration 2	Captured in A.3.8.3.2
CQI/PMI perio configuration in	dicity and offset ndex on cell2		TBD	CQI reporting for PSCell every uplink subframe
Cell-individual RF channel nu	offset for cells on imber 1	dB	0	Individual offset for cells on primary component carrier.
	ell-individual offset for cells on channel number 2		0	Individual offset for cells on carrier frequency of cell2.
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2		S	1	During this time the UE adds the PSCell.
ТЗ		s	1	During this time the UE sends CSI reports for PSCell.
T4		S	1	During this time the UE releases the PSCell.

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Davameter	Unit Config		Test				
Parameter	Unit	Config	T1	T2	T3	T4	
E-UTRA Channel		1,2		1			
Number		·					
NR Channel Number		1,2	2				
Duplex Mode		1,2		TDD			
TDD configuration		1,2	TDDConf.1.2				
BWchannel	MHz	1,2	10	00: NRB,	c = 66		
Initial BWP		1,2		DLBWP			
Configuration		1,2		ULBWP			
Dedicated BWP		1,2		DLBWP	.1.1		
Configuration		·		ULBWP			
TRS Configuration		1		TRS.2.1	TDD		
TCI State		1	С	SI-RS.Co	onfig.0		
PDSCH Reference		1,2		SR.3.1 T			
measurement channel		1,2		3K.3.1 I	טט		
RMSI CORESET		1,2		CR.3.1 T	מח		
Reference Channel		1,2		OIX.S.1 I	טט		
Dedicated CORESET		1,2		CCR.3.1	TDD		
Reference Channel			,				
OCNG Patterns		1,2		OP.1			
SSB configuration		1,2	SSB.1 FR2				
SMTC configuration		1,2		SMTC			
TRS Configuration		1,2		TRS.2.1 TDD			
EPRE ratio of PSS to							
SSS							
EPRE ratio of PBCH							
DMRS to SSS							
EPRE ratio of PBCH to							
PBCH DMRS							
EPRE ratio of PDCCH							
DMRS to SSS							
EPRE ratio of PDCCH	15	4.0		•			
to PDCCH DMRS	dB	1,2	0				
EPRE ratio of PDSCH							
DMRS to SSS EPRE ratio of PDSCH							
to PDSCH EPRE ratio of OCNG							
DMRS to SSS(Note 1)							
EPRE ratio of OCNG							
to OCNG DMRS (Note							
1)							
Propagation condition		1,2		AWGI	NI.		
r ropagation condition		∠,۱	1	AVVGI	V		

Parameter Unit Test Setup 2a according to clause Angle of arrival configuration A.3.15.2.1 N_{oc} Note1 dBm/15kHzNote4 **TBD** N_{oc} Note1 dBm/SCSNote3 **TBD** \hat{E}_s/N_{oc} **TBD** dB SS-RSRPNote2 dBm/SCS Note4 TBD \hat{E}_{s}/I_{ot} **TBD** dB Io^{Note2} dBm/95.04 MHz Note4 TBD Note 1: Interference from other cells and noise sources not specified in the test is assumed to be

Table A.5.5.7.1.1-4: OTA related test parameters

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest $582 \text{ ms}^{\text{Note1}}$ into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest [20] ms into T5.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2ms$$

Where:

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 40 ms$

 $T_{search} = 8*3*20 = 480 \text{ ms}$

 $T_{\Delta}\!=20ms$

 $T_{PSCell_DU} = 1*10+10 = 20 \text{ ms}$

A.5.5.8 Active TCI state switch delay

A.5.5.8.1 MAC-CE based active TCI state switch

A.5.5.8.1.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different TCI states for PSCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 2 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The is UE configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1.

The test equipment verifies that UE can be scheduled on PSCell on TCI state 0 till n+ T_{HARQ} +3 ms + $T_{first-SSB}$. The test equipment also verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + $(T_{first-SSB} + T_{SSB-proc})$.

Table A.5.5.8.1.1.1-1: Supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.5.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		-	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.5.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2			
Frequency Range		FR2			
Duplex mode		TDD			
TDD configuration		TDDConf.3.1			
BW _{channel}		100 MHz: N _{RB,c} = 66			
Initial DL BWP Configuration		DLBWP.0.2			
Dedicated DL BWP Configuration		DLBWP.1.1			
Initial UL BWP Configuration		ULBWP.0.2			
Dedicated UL BWP Configuration		ULBWP.1.1			
PDSCH Reference measurement channel		SR.3.1 TDD			
RMSI CORESET parameters		CR.3.1 TDD			
Dedicated CORESET parameters		CCR.3.1 TDD			
OCNG Patterns		OP.1			
SSB Configuration		SSB.1 FR2			
SMTC Configuration		SMTC.1			
TCI State 0		TC. State.0			
TCI State 1		TCI.State.1			
TRS Configuration		TRS.2.1 TDD			
Correlation Matrix and Antenna		1x2 Low			
Configuration					
EPRE ratio of PSS to SSS	dB	0			
EPRE ratio of PBCH DMRS to SSS]				
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS]				
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS]				
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note]				
1)					
Propagation Condition		AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Parameter Unit Cell 2 SSB0 SSB₁ T1 T1 **T2 T2** Setup 3 according to clause A.3.15.3 Angle of arrival configuration AoA1 AoA2 N_{oc}Note 1 dBm/15 kHz [-92.1]Noc Note 1 dBm/SCS [-83.1]Ês/No dB 1 -Infinity SS-RSRP Note 2 dBm/120 kHz Note3 -82.1 -82.1 -Infinity -82.1 Io^{Note2,Note6} dBm/95.04 MHz Note4 -54.94 -54.94 -54.94 -54.94

Table A.5.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm oc}$ to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

A.5.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $\,$ n+ T_{HARQ} +3 ms + $T_{first-SSB}$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + TO_k * $T_{first-SSB}$

A.5.5.8.2 RRC based active TCI state switch

A.5.5.8.2.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 1 TCI state for PSCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state0 starts transmitting. The is UE configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing} + T_{first-SSB} + 2ms$.

Table A.5.5.8.2.1.1-1: Supported test configurations

Config		Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only re	he UE is only required to be tested in one of the supported test configurations		

Table A.5.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		I	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.5.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BWchannel		100 MHz: N _{RB,c} = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.0
TCI State 1		TCI.State.1
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Parameter Unit Cell 2 SSB0 SSB1 T1 **T2** T1 **T2** Setup 3 according to clause A.3.15.3 Angle of arrival configuration AoA1 N_{oc}Note 1 dBm/15 kHz [-92.1]Noc Note 1 [-83.1] dBm/SCS Ês/No dB 1 -Infinity SS-RSRP Note 2 dBm/120 kHz Note3 -82.1 -82.1 -Infinity -82.1 Io^{Note2,Note6} dBm/95.04 MHz Note4 -54.9 -54.9 -54.9 -54.9

Table A.5.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

A.5.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + $T_{first-SSB}$ + 2ms.

A.5.6 Measurement procedure

A.5.6.1 Intra-frequency Measurements

A.5.6.1.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.1.1-1.

Table A.5.6.1.1.1-1: supported test configurations

Co	onfiguration	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.1.1-2, A.5.6.1.1.1-3 and A.5.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3	One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1	
A3-Offset	dB	1~4	-6	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between Cell 1 and Cell 2		1~4	3 μs	Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs	Synchronous cells
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration	1~4	TDDConf.3.1	TDDConf.3.1
Intial BWP	1~4	DLBWP.0.1	DLBWP.0.1
	1~4	_	_
configuration		ULBWP.0.1	ULBWP.0.1
Active DL BWP	1~4	DLBWP.1.1	DLBWP.1.1
configuration			
Active UL BWP	1~4	ULBWP.1.1	ULBWP.1.1
configuration			
RLM-RS	1~4	SSB	SSB
PDSCH RMC	1~4	SR.3.1 TDD	N/A
configuration			
RMSI CORESET	1~4	CR.3.1 TDD	CR.3.1 TDD
RMC			
configuration			
Dedicated	1~4	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			
configuration			
OCNG Patterns	1~4	OP.1	OP.1
TRS configuration	1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH	1~4	TCI.State.2	N/A
TCI state			
SSB configuration	1, 2	SSB.1 FR2	SSB.1 FR2
	3, 4	SSB.2 FR2	SSB.2 FR2
Propagation	1~4	AV	VGN
Condition			

Table A.5.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Ce	ell 2	Cell 3			
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 3 defi	ned in A.3.1	5.3		
			Ac	A1	Ao	A2		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4	4	-Infinity	8		
N_{oc} Note 2	dBm/15 KHz	1~4		-	102			
N_{oc} Note 2	dBm/SCS	1, 2		-93				
TV oc		3, 4		-90				
SS-RSRP	dBm/SCS	1, 2	-89	-89	-Infinity	-85		
		3, 4	-86	-86	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	8		
Io	dBm/95.04MHz	1~4	-58	3.56	-55	.38		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.2 EN-DC event triggered reporting test without gap under DRX

A.5.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.2.1-1.

Table A.5.6.1.2.1-1: supported test configurations

Configuration		Description		
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	y required to be tested in one of the supported test configurations.		

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.2.1-2 ~ Table A.5.6.1.2.1-6 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1 1	E-UTRAN I	PCell (Cell 1)	
		1~4	PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number			1: Cell 1		One TDD carrier frequency is used for the NR
		1~4	2: Cell 2 and Cell 3		cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1		
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	S	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.2	DRX related parameters are defined in Table A.5.6.1.2.1-4
Time offset between Cell 1 and Cell 2		1~4	3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs		Synchronous cells
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 2	Cell 3
			T1 T2	T1 T2
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1~4	SSB	SSB
PDSCH RMC		1~4	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1~4	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1~4	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
OCNG Patterns		1~4	OP.1	OP.1
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
TCI state	· · · · · · · · · · · · · · · · · · ·	1~4	CSI-RS.Config.0	N/A
SSB configuration		1, 2	SSB.1 FR2	SSB.1 FR2
		3, 4	SSB.2 FR2	SSB.2 FR2
Propagation		1~4	AV	VGN
Condition				

Table A.5.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Unit Config		II 2	Cell 3			
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 1 defii	ned in A.3.1	5.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4			-1.46		
N_{oc} Note 2	dBm/15 KHz	1~4		-98				
N_{oc} Note 2	dBm/SCS	1, 2		-89				
1 voc		3, 4		-86				
SS-RSRP	dBm/SCS	1, 2	-85	-85	-Infinity	-85		
		3, 4	-82	-82	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4		
Io	dBm/95.04MHz	1, 2	-54.56	-52.21	-54.56	-52.21		
Note 1: The res	sources for uplink transm	ission are assigne	ed to the UE	prior to the	start of time	e period		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.3 EN-DC event triggered reporting test with per-UE gaps under non-DRX

A.5.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.3.1-1.

Table A.5.6.1.3.1-1: supported test configurations

Co	nfiguration	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only re	is only required to be tested in one of the supported test configurations.				

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell			E-UTRAN	
		1~4	PCell (Cell 1)	
		1~4	PSCell (Cell	
			2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number			1: Cell 1	One TDD carrier frequency is used for the NR cells
		1~4	2: Cell 2 and	and one TDD or FDD carrier frequency is used for E-
			Cell 3	UTRAN cell.
Gap type		1~4	Per-UE gaps	
Measurement gap	ms	1~4	40	
repitition periodicity		1~4		
Measurement gap	ms	1~4	6	
length		1~4		
Measurement gap	ms	1~4	39	
offset				
SMTC configuration		1~4	SMTC.1	
CSI-RS parameters		1~4	CSI-RS.3.2	
			TDD	
A3-Offset	dB	1~4	-6	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between		1~4	3 μs	Synchronous EN-DC
Cell 1 and Cell 2		1~4	•	
Time offset between		1~4	3 μs	Synchronous cells
Cell 2 and Cell 3		-~4		
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration	1~4	TDDConf.3.1	TDDConf.3.1
Intial BWP	1~4	DLBWP.0.1	DLBWP.0.1
configuration		ULBWP.0.1	ULBWP.0.1
Active DL BWP	1~4	DLBWP.1.2	DLBWP.1.1
configuration			
Active UL BWP	1~4	ULBWP.1.2	ULBWP.1.1
configuration			
RLM-RS	1~4	CSI-RS	SSB
PDSCH RMC	1~4	SR.3.1 TDD	N/A
configuration			
RMSI CORESET	1~4	CR.3.1 TDD	CR.3.1 TDD
RMC			
configuration			
Dedicated	1~4	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			
configuration			
TRS configuration	1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH	1~4	TCI.State.2	N/A
TCI state			
OCNG Patterns	1~4	OP.1	OP.1
SSB	1, 2	SSB.1 FR2	SSB.1 FR2
	3, 4	SSB.2 FR2	SSB.2 FR2
Propagation	1~4	AV	VGN
Condition			

Table A.5.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit Config		Ce	II 2	Ce	II 3		
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 3 defir	ned in A.3.1	5.3		
			Ao	A1	Ao	A2		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4	4	-Infinity	8		
N_{oc} Note 2	dBm/15 KHz	1~4		-	102			
N_{oc} Note 2	dBm/SCS	1, 2		-93				
TV oc		3, 4	-90					
SS-RSRP	dBm/SCS	1, 2	-89	-89	-Infinity	-85		
		3, 4	-86	-86	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	3, 4	4	4	-Infinity	8		
Io	dBm/95.04MHz	1~4	-58	3.56	-55	.38		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.4 EN-DC event triggered reporting test with per-UE gaps under DRX

A.5.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.4.1-1.

Table A.5.6.1.4.1-1: supported test configurations

Co	nfiguration	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only re	y required to be tested in one of the supported test configurations.				

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.4.1-2 \sim 6.

During the test, Cell 2 and Cell 3 are transmitted from the direction determined according to A3.8.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
		Ì	Test 1	Test 2	

Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3		One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE ga	aps	
Measurement gap repitition periodicity	ms	1~4	40		
Measurement gap length	ms	1~4	6		
Measurement gap offset	ms	1~4	39		
SMTC configuration		1~4	SMTC.1		
CSI-RS parameters		1~4	CSI-RS.3.	2 TDD	
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	s	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.2	DRX related parameters are defined in Table A.5.6.1.4.1-5
Time offset between Cell 1 and Cell 2		1~4	3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs		Synchronous cells
T1	s	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	Cell 2		II 3
			T1	T1 T2		T2
TDD configuration		1~4	TDDC	onf.3.1	TDDC	onf.3.1
Intial BWP		1~4	DLBV	/P.0.1	DLBV	VP.0.1
configuration			ULBV	/P.0.1	ULBV	VP.0.1
Active DL BWP		1~4	DLBV	/P.1.2	DLBV	VP.1.1
configuration						
Active UL BWP		1~4	ULBV	/P.1.2	ULBV	VP.1.1
configuration						
RLM-RS		1~4	CSI	-RS	S	SB
PDSCH RMC		1~4	SR.3.	1 TDD	N	/A
configuration						
RMSI CORESET		1~4	CR.3.	1 TDD	CR.3.	1 TDD
RMC						
configuration						
Dedicated		1~4	CCR.3	.1 TDD	CCR.3	.1 TDD
CORESET RMC						
configuration						
TRS configuration		1~4	TRS.2	1 TDD	N	/A
PDSCH/PDCCH		1~4	TCI.S	TCI.State.2		/A
TCI state						
OCNG Patterns		1~4	OF	OP.1		P.1
SSB		1, 2	SSB.	1 FR2	SSB.	1 FR2
		3, 4	SSB.2	2 FR2	SSB.	2 FR2

Propagation	1~4	AWGN
Condition		

Table A.5.6.1.4.1-4: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	II 2	Cell 3			
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 1 defii	ned in A.3.1	5.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4	-1.46	-Infinity	-1.46		
N_{oc} Note 2	dBm/15 KHz	1~4		-98				
Note 2	dBm/SCS	1, 2		-89				
1 voc		3, 4		-86				
SS-RSRP	dBm/SCS	1, 2	-85	-85	-Infinity	-85		
		3, 4	-82	-82	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4		
Io	dBm/95.04MHz	1, 2	-54.56	-52.21	-54.56	-52.21		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.5.6.1.4.1-5: Void

Table A.5.6.1.4.1-6: Void

A.5.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.20s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2 Inter-frequency Measurements

A.5.6.2.1 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.1.1-1, A.5.6.2.1.1-2, and A.5.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.1.1-1.

Table A.5.6.2.1.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	te 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell ha	s the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel		Config 1,2		1	One E-UTRAN TDD carrier		
Number		-			frequencies is used.		
NR RF Channel Number		Config 1,2	1,	, 2	Two FR1 NR carrier frequencies is used.		
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2	39	39			
SMTC-SSB parameters		Config 1,2	SSB.1 FR2		As specified in clause A.3.10.2		
A3-Offset	dB	Config 1,2	[-30]				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Normal				
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0		L3 filtering is not used		
DRX		Config 1,2	OFF		DRX is not used		
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.		
T1	S	Config 1,2	5				
T2	S	Config 1,2	5.2 for PC1; 5.2 for PC1; 3.5 for other PC PC				

Table A.5.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit Test		Ce	ell 2	Cell 3	
		configuratio n	T1	T2	T1	T2
AoA setup		Config 1,2	Setu	ıp 3 as spec	fied in claus	A.3.15
			Ac	A1	AoA2	
NR RF Channel Number		Config 1,2		1	2	
Duplex mode		Config 1,2	TI	DD	TDD	
BWchannel	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 66	
BWP BW	MHz	Config 1,2	100: N	$_{RB,c} = 66$	100: N _{RB,c} = 66	
TDD configuration		Config 1,2	TDDC	onf.3.1	TDDConf.3.1	
Initial DL BWP		Config 1,2	DLBWP.0.1		DLBWP.0.1	
Initial UL BWP		Config 1,2	ULBV	VP.0.1	NA	

Dedicated DL BWP		Config 1,2	DLBV	VP.1.1	N	A	
Dedicated UL BWP		Config 1,2	ULBWP.1.1		N	A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	0	P.1	OF	OP.1	
TRS configuration		Config 1,2	TRS.2	.1 TDD	N	A	
TCI configuration		Config 1,2	CSI-RS	.Config.0	N	A	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		=	
SMTC configuration defined in A.3.11		Config 1,2	SM	TC.1	SMT	ГС.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1	20	12	20	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) Noce Note 2	dBm/15	Config 1,2	0 NA		O NA		
N_{oc}^{Note2}	Note5 dBm/S	Config 1,2	N	IA	N	A	
	CS Note4		10/1				
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87	
\hat{E}_s/I_{ot}	dB	Config 1,2	NA	NA	-Infinity	NA	
	dB	Config 1,2	NA	NA	-Infinity	NA	
\hat{E}_s/N_{oc} IoNote3 Propagation Condition	dBm/95 .04 MHz Note5	Config 1,2	-87	-87	-Infinity	-87	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They
	are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at

- each receiver antenna port.

 Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.1.2 Test Requirements

Note 5:

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.2 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.2.1-1, A.5.6.2.2.1-2, and A.5.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1			4	
E-UTRA RF Channel		Config 1,2		•	1		One E-UTRAN TDD carrier
Number NR RF Channel		Config 1,2			2		frequencies is used. Two FR1 NR carrier frequencies is
NK KF Channel Number		Coning 1,2		Ι,	. 2		used.
Number							useu.
Active cell		Config 1,2	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
		_	cell 2 (PScell)			channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel
		0 " 10			10		number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap		Config 1,2	39		39		
offset		.,_					
SMTC-SSB parameters		Config 1,2	SSB.1	FR2			As specified in clause A.3.10.2
·		_					
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	ıl			
TimeToTrigger	S	Config 1,2	0				100
Filter coefficient		Config 1,2	0	BB\/		L 5 5 1/	L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between		Config 1,2	3 μs				Synchronous EN-DC
PCell and PSCell							
Time offset between		Config 1,2	3µs				Synchronous cells.
serving and neighbour							
cells		0 " 10	_				
T1	S	Config 1,2	5	00	0.6	00	
T2	S	Config 1,2	8 for	82	8 for	82 for	
			PC1; 5 for	for PC1;	PC1; 5 for	PC1;	
			othe	52	1; 5 for PC1; othe 52		
			r PC	5∠ for			
			' ' '	othe	' ' '	other	
				r PC		PC	
·		I		·			

Table A.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio	T1	T2	T1	T2
		n				

AoA setup		Config 1,2	Setup 1 as specified in clause A.3.15			
NR RF Channel Number		Config 1,2	,	I		2
Duplex mode		Config 1,2	TD)D	-	ΓDD
BW _{channel}	MHz	Config 1,2	100: N _F	100: N _{RB,c} = 66		N _{RB,c} = 66
BWP BW	MHz	Config 1,2		RB,c = 66	100: N _{RB,c} = 66	
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA
Initial UL BWP		Config 1,2	ULBW	/P.0.1		
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	()P.1
TRS configuration		Config 1,2	TRS.2.	1 TDD		NA
TCI configuration		Config 1,2	CSI-RS.	Config.0		NA
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1,2	CR.3.	1 TDD	-	
SMTC configuration defined in A.3.11		Config 1,2	SMT	ΓC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20	120	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	()		0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{\it oc}^{ m Note2}$	dBm/15 kHz Note5		-104.7		-1	04.7
$N_{oc}^{ m Note2}$	dBm/S CS Note4	Config 1,2	-95.7		-95.7	
SS-RSRP Note 3	dBm/S CS	Config 1,2	-89.7	-89.7	-Infinity	-86.7
Ê/I	Note5 dB	Config 1,2	6	6	-Infinity	9
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	<u> </u>	551g 1,2	,	,		l

\hat{E}_s/N_{oc}	,	dB	Config 1,2	6	6	-Infinity	9	
Io ^{Note3}		dBm/95	Config 1,2	-59.7	-59.7	-66.7	-57.2	
		.04	_					
		MHz						
		Note5						
Propagation Condition			Config 1,2	AWGN				
Note 1:	OCNG shall be used	IG shall be used such that both cells are fully allocated and a constant total transmitted power						
	spectral density is achieved for all OFDM symbols.							
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant							
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{_{\mathit{oc}}}$ to be							
	fulfilled.							
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They							
	are not settable parameters themselves.							
Note 4:								
	each receiver antenna port.							
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone							

A.5.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

As observed with 0 dBi gain antenna at the centre of the quiet zone

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is

provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations					
Note 2:	te 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell						

Table A.5.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Parameter Unit Test Value		Comment				
		configurati on	Test 1	Test 2			
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequencies is used.		
NR RF Channel Number		Config 1,2	1	, 2	Two FR1 NR carrier frequencies is used.		
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2	0 13		As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2	39	39			
SMTC-SSB parameters		Config 1,2	SSB.1 FR2		As specified in clause A.3.10.2		
A3-Offset	dB	Config 1,2	[-30]				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Normal				
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0		L3 filtering is not used		
DRX		Config 1,2	OFF		DRX is not used		
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.		
T1	S	Config 1,2	5				
T2	S	Config 1,2	7 for PC1; 7 for PC1; 4.5 for other PC PC				

Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio n	T1	T2	T1	T2
AoA setup		Config 1,2	Setup 3 as specifi		ied in clause A.3.15	
			AoA1		AoA2	
NR RF Channel Number		Config 1,2	1	1		2
Duplex mode		Config 1,2	ТГ	DD	-	TDD
BW _{channel}	MHz	Config 1,2		RB,c = 66		$N_{RB,c} = 66$
BWP BW	MHz	Config 1,2		$R_{B,c} = 66$	100:	$N_{RB,c} = 66$
TDD configuration		Config 1,2		onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA
Initial UL BWP		Config 1,2	DLBW	/P.0.1		
Dedicated DL BWP		Config 1,2	DLBW	/P.1.1		NA
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	(OP.1
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1,2	CR.3.1 TDD		-	
TRS configuration		Config 1,2	TRS.2.1 TDD		NA	
TCI configuration		Config 1,2	CSI-RS.	Config.0	NA	
SMTC configuration defined in A.3.11		Config 1,2	SMT	ΓC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS	kHz	Config 1,2	12	20		120
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	()		0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N _{oc} Note2	dBm/15 kHz Note5		N	A		NA

N_{oc} Note2	dBm/S CS Note4	Config 1,2	NA		NA	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87
\hat{E}_s/I_{ot}	dB	Config 1,2	NA	NA	-Infinity	NA
\hat{E}_s/N_{oc}	dB	Config 1,2	NA	NA	-Infinity	NA
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2	-87	-87	-Infinity	-87
Propagation Condition		Config 1,2	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.4 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.4.1-1, A.5.6.2.4.1-2, and A.5.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table

A.5.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.4.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.4.1-1: EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:						
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel Number		Config 1,2		•	1		One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2		1, 2			Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)		NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.	
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.1	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3µs				Synchronous cells.
T1	s	Config 1,2	5	<u> </u>			
T2	S	Config 1,2	for PC1; 6.5 for othe r PC	for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	for PC1; 67 for other PC	

Table A.5.6.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio n	T1	Т2	T1	T2
AoA setup		Config 1,2	Setup 1 as specified in clause A.3.1			e A.3.15
NR RF Channel Number		Config 1,2	,	1		2
Duplex mode		Config 1,2	TE	DD	TDD	
BW _{channel}	MHz	Config 1,2	100: N _F	100: N _{RB,c} = 66		$N_{RB,c} = 66$
BWP BW	MHz	Config 1,2	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
TDD configuration		Config 1,2	TDDC	TDDConf.3.1		Conf.3.1

Initial DL BWP		Config 1,2	DLBV	VP.0.1	ı	NA
Initial UL BWP		Config 1,2	ULBV	VP.0.1		
Dedicated DL BWP		Config 1,2	DLBV	/P.1.1	1	NA
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1	1	NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	0	P.1
PDSCH Reference measurement channel		Config 1,2		1 TDD		-
CORESET Reference Channel		Config 1,2		1 TDD		-
TRS configuration		Config 1,2	TRS.2	.1 TDD	ľ	NA
TCI configuration		Config 1,2	CSI-RS.	Config.0	1	NA
SMTC configuration defined in A.3.11		Config 1,2	SM	ΓC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20	120	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS					0	
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	(0		
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{ ext{Note2}}$	dBm/15 kHz Note5		-10	4.7	-1	04.7
N_{oc} Note2	dBm/S CS Note4	Config 1,2	-9	5.7	-6	95.7
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	-89.7	-89.7	-Infinity	-86.7
\hat{E}_{s}/I_{ot}	dB	Config 1,2	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2	6	6	-Infinity	9
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1,2		A	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
Note 3:	fulfilled. SS-RSRP and lo levels have been derived from other parameters for information purposes. They

- are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.2.4 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,						
	duplex mode	100 MHz bandwidth, TDD						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode						
	duplex mode							
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD							
	duplex mode							
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD							
	duplex mode							
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
Note: The L	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1,	, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.1 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3,4,5,6	6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	[-120]		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs		Synchronous cells.
T1	s	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	5.2 for PC1; 3.5 for other PC	5.2 for PC1; 3.5 for other PC	

Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2	Cell 3
		configuratio n	T1 T2	T1 T2
AoA setup		Config 1,2,3,4,5,6	NA	Setup 1 as specified in clause A.3.15
NR RF Channel Number		Config 1,2,3,4,5,6	1	2
Duplex mode		Config 1,4	FDD	TDD
'		Config 2,3,5,6	TDD	TDD
BWchannel	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 3,6	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5	10: $N_{RB,c} = 52$	100: N _{RB,c} = 66
		Config 3,6	40: $N_{RB,c} = 106$	100: N _{RB,c} = 66
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.3.1
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1	NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1	OP.1
PDSCH Reference		Config 1,4	SR.1.1 FDD	-
measurement channel		Config 2,5	SR.1.1 TDD	
		Config 3,6	SR2.1 TDD	
CORESET Reference		Config 1,4	CR.1.1 FDD	-
Channel		Config 2,5	CR.1.1 TDD	
		Config 3,6	CR2.1 TDD	
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.2
		Config 2,3,5,6	SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2,4,5	15	120
spacing		Config 3,6	30	120
EPRE ratio of PSS to SSS		Coming 5,6		120
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS		Config		
EPRE ratio of PDCCH DMRS to SSS		Config 1,2,3,4,5,6	0	0
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				

EPRE ratio of PDSCH to					
PDSCH					
EPRE ratio of OCNG DMRS					
to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
$N_{oc}^{\rm Note2}$	dBm/15			N	IA
oc oc	kHz				
	Note5				
$N_{oc}^{ m Note2}$	dBm/S	Config		N	IA
1♥ oc	CS	1,2,4,5			
	Note4	Config 3,6		N	IA
SS-RSRP Note 3	dBm/S	Config		-Infinity	-87
	CS	1,2,4,5			٥.
	Note5	Config 3,6		-Infinity	-87
\hat{E}_s/I_{ot}	dB	Config		-Infinity	NA
$\mathbf{L}_{\mathrm{s}}/1_{\mathrm{ot}}$		1,2,3,4,5,6	NA		
\hat{E}_s/N_{oc}	dB	Config	Link only, see clause	-Infinity	NA
E_s/W_{oc}		1,2,3,4,5,6	A.3.7A		
Io ^{Note3}	dBm/9.	Config		-	-
	36MHz	1,2,4,5			
	dBm/38	Config 3,6		-	_
	.16MHz	• • • • • • • • • • • • • • • • • • •			
	dBm/95	Config		-Infinity	-87
	.04	1,2,3,4,5,6			0.
	MHz	1,2,0,1,0,0			
	Note5				
Propagation Condition	1,0,00	Config		ΑW	/GN
		1,2,3,4,5,6		, , ,	
Note 1: OCNG shall be use	d such that h		v allocated and a constar	nt total transm	itted nowe

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,					
	duplex mode	100 MHz bandwidth, TDD					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode					
	duplex mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD						
	duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD						
	duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config	1			One E-UTRAN TDD carrier	
Number		1,2,3,4,5,6					frequencies is used.
NR RF Channel		Config	1, 2			Two FR1 NR carrier frequencies is	
Number		1,2,3,4,5,6	·			used.	

Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		I NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.	
Neighbour cell		Config 1,2,3,4,5,6	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39		39		
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1				As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.1	FR2			As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3,4,5,6	6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
a4-Threshold	dBm	Config 1,2,3,4,5,6	[-120]				
CP length		Config 1,2,3,4,5,6	Normal				
TimeToTrigger	S	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2 T1 T2		Cell 3		
		configuratio			T1	T2	
		n					
AoA setup		Config	NA		Setup 1 as specified in		
·		1,2,3,4,5,6			claus	se A.3.15	
NR RF Channel Number		Config	1		2		
		123456					

Duplex mode		Config 1,4	FDD	TDD
•		Config	TDD	TDD
		2,3,5,6		
BWchannel	MHz	Config 1,4	10: N _{RB,c} = 52	100: $N_{RB,c} = 66$
		Config 2,5	10: N _{RB,c} = 52	100: $N_{RB,c} = 66$
BIAID BIAI		Config 3,6	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5	10: N _{RB,c} = 52	100: N _{RB,c} = 66
TDD configuration		Config 3,6	40: N _{RB,c} = 106 TDDConf.1.1	100: N _{RB,c} = 66 TDDConf.3.1
TDD configuration		Config 2,5	TDDConi.1.1	
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1	NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1	OP.1
PDSCH Reference		Config 1,4	SR.1.1 FDD	-
measurement channel		Config 2,5	SR.1.1 TDD	
		Config 3,6	SR2.1 TDD	
CORESET Reference		Config 1,4	CR.1.1 FDD	
Channel		Config 2,5	CR.1.1 TDD	-
Charmer .		Config 3,6	CR2.1 TDD	
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.2
		Config 2,3,5,6	SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config	15	120
spacing		1,2,4,5	_	
		Config 3,6	30	120
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH				
DMRS				
EPRE ratio of PDCCH DMRS				
to SSS				
EPRE ratio of PDCCH to		Config	0	0
PDCCH DMRS EPRE ratio of PDSCH DMRS		1,2,3,4,5,6		U
to SSS				
EPRE ratio of PDSCH to				
PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
	dBm/15			-104.7
$N_{\it oc}^{ m Note2}$	kHz		NA Liely anhy and along	10 1.1
λ/ Note2	Note5	Confin	Link only, see clause A.3.7A	05.7
N_{oc}^{Note2}		Config 1,2,4,5	A.S./ A	-95.7
		1,4,4,0	1	

	dBm/S	Config 3,6	_	95.
	CS			
	Note4			
SS-RSRP Note 3	dBm/S	Config	-Infinity	
	CS	1,2,4,5		
	Note5	Config 3,6	-Infinity	
\hat{E}_{s}/I_{ot}	dB	Config	-Infinity	
s / Tot		1,2,3,4,5,6	_	
\hat{E}_s/N_{oc}	dB	Config	-Infinity	
E_s/V_{oc}		1,2,3,4,5,6	_	
Io ^{Note3}	dBm/9.	Config	-	
	36MHz	1,2,4,5		
	dBm/38	Config 3,6	-	
	.16MHz	_		
	dBm/95	Config	-66.7	
	.04	1,2,3,4,5,6		
	MHz			
	Note5			
Propagation Condition		Config	A	WGI
		1,2,3,4,5,6		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,				
	duplex mode	100 MHz bandwidth, TDD				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode				
	duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD					
	duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD					
	duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD					
	duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD					
	duplex mode					
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6		1	One E-UTRAN TDD carrier frequencies is used.
NR RF Channel		Config	1,	2	Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.1 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3,4,5,6	6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	[-120]		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2			Cell 3	
		configuratio	T1	T2	T1	T2	
A - A 1		n		1.0	0.1	: (f) 1 !	
AoA setup		Config 1,2,3,4,5,6	NA Setup 1 as s		is specified in se A.3.15		
NR RF Channel Number		Config		1	Claus	2	
THE THE SHAFING FRANCE		1,2,3,4,5,6		•		_	
Duplex mode		Config 1,4	FI	DD	-	TDD	
		Config	TI	DD		TDD	
		2,3,5,6					
BW _{channel}	MHz	Config 1,4		B,c = 52		N _{RB,c} = 66	
		Config 2,5 Config 3,6		$B_{,c} = 52$ $B_{,c} = 106$		N _{RB,c} = 66 N _{RB,c} = 66	
BWP BW	MHz	Config 1,4		$_{B,c} = 100$ $_{B,c} = 52$		N _{RB,c} = 66	
BWI BW	IVII IZ	Config 2,5		$_{B,c} = 52$		$N_{RB,c} = 66$	
		Config 3,6		$B_{,c} = 106$	100:	$N_{RB,c} = 66$	
OCNG Patterns defined in		Config		P.1		OP.1	
A.3.2.1.1 (OP.1)		1,2,3,4,5,6					
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-	
measurement channel		Config 2,5	SR.1.	1 TDD	-		
		Config 3,6		1 TDD	-		
CORESET Reference		Config 1,4		1 FDD		-	
Channel		Config 2,5	CR.1.	1 TDD			
		Config 3,6	CR2.1 TDD				
TDD configuration		Config 2,5	TDDConf.1.1		TDDConf.3.1		
		Config 3,6	TDDC	onf.2.1	TDD	Conf.3.1	
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		NA		
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA		
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBV	VP.1.1		NA	
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBV	VP.1.1		NA	
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SI	MTC.2	
		Config 2,3,5,6	SM	TC.1	SI	MTC.1	
PDSCH/PDCCH subcarrier	kHz	Config	1	15		120	
spacing		1,2,4,5					
		Config 3,6	30			120	
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS		Config				_	
EPRE ratio of PDCCH DMRS to SSS		1,2,3,4,5,6	1	0		0	
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							

l				
dBm/15			N	IA
kHz				
Note5				
dBm/S	Config		N	IA
CS	1,2,4,5			
Note4	Config 3,6		N	IA
dBm/S			-Infinity	-87
CS			, I	
Note5	Config 3,6		-Infinity	NA
dB	Config		-Infinity	NA
	1,2,3,4,5,6	NA	,	
dB	Config	Link only, see clause	-Infinity	-87
	1,2,3,4,5,6	A.3.7A		
dBm/9.	Config		-	-
36MHz	1,2,4,5			
dBm/38	Config 3,6		-	-
.16MHz	-			
dBm/95	Config		-Infinity	-87
.04	1,2,3,4,5,6		,	
MHz				
Note5				
	Config		AW	/GN
	1,2,3,4,5,6			
	kHz Note5 dBm/S CS Note4 dBm/S CS Note5 dB dB dB dB dBm/9. 36MHz dBm/38 .16MHz dBm/95 .04 MHz Note5	kHz Note5 Config CS 1,2,4,5 Note4 Config 3,6 dBm/S CS Note5 Config 3,6 dB Config 3,6 dB Config 1,2,3,4,5,6 dB Config 1,2,3,4,5,6 dBm/9. Config 1,2,4,5 dBm/38 Config 3,6 dBm/38 Config 3,6 dBm/95 Config 1,2,3,4,5,6 MHz Note5 Config 1,2,3,4,5,6	kHz Note5 Config CS 1,2,4,5 Note4 Config Config CS 1,2,4,5 Note5 Note5 Config CS 1,2,3,4,5,6 NA Link only, see clause dBm/9. 36MHz 1,2,3,4,5,6 dBm/9. 36MHz 1,2,4,5 dBm/38 .16MHz dBm/95 Config 1,2,3,4,5,6 MHz Note5 A.3.7A	kHz Note5 Config CS 1,2,4,5 Note4 N dBm/S CS 1,2,4,5 Note5 Config CS 1,2,4,5 Note5 -Infinity dB Config 1,2,3,4,5,6 NA -Infinity dB Config 1,2,3,4,5,6 NA -Infinity dBm/9. Config 36MHz 1,2,4,5 A.3.7A -Infinity dBm/38 Config 3,6 .16MHz dBm/95

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.8.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,					
	duplex mode	100 MHz bandwidth, TDD					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode					
	duplex mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD						
	duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD						
	duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6		,	1		One E-UTRAN TDD carrier frequencies is used.
NR RF Channel		Config		1, 2			Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6		• :	_		used.
Active cell		Config		ell 1 (Po	Cell) and	d NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2	(PScell)			channel number 1. NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	0		13		As specified in clause 9.1.2-1.
		1,2,3,4,5,6					
Measurement gap		Config	39		39		
offset SMTC-SSB parameters		1,2,3,4,5,6 Config 1,4	SSB.1	ED1			As specified in clause A.3.10.1
on NR RF Channel 1		Coming 1,4	335.1	1 17 1			As specified in clause A.S. 10.1
on ractal onamion		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		J 3 ,1					·
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
01470.000			005 4	===			
SMTC-SSB parameters on NR RF Channel 2		Config	SSB.1	FR2			As specified in clause A.3.10.2
offsetMO	dB	1,2,3,4,5,6 Config	6				
Onselivio	ub	1,2,3,4,5,6	0				
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
a4-Threshold	dBm	Config	[-120]				
CP length		1,2,3,4,5,6 Config	Norma	al .			
OF length		1,2,3,4,5,6	INOTITIO	ai			
TimeToTrigger	S	Config	0				
		1,2,3,4,5,6					
Filter coefficient		Config	0				L3 filtering is not used
DDV		1,2,3,4,5,6	DDV	DDV	DDV	DDV	As an ariffed in alarma A O O
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between		Config	3 μs			1	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	,,,,				•
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 3 is 3ms later
cells		Config	2				than the timing of Cell 2. Synchronous cells.
		2,3,5,6	3μs			Synchronous cens.	
		_,,,,,,					
T1	s	Config 1,2,3,4,5,6	5				
T2	S	Config	11	108	11	108	
		1,2,3,4,5,6	for	for	for	for	
			PC1;	PC1;	PC1;	PC1;	
			6.5 for	67 for	6.5 for	67 for	
			othe	othe	othe	other	
			r PC	r PC	r PC	PC	

Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2			Cell 3
		configuratio	T1	T2	T1	T2
A - A 1		n		1.0	0.1	: (f) 1 !
AoA setup		Config 1,2,3,4,5,6	NA		Setup 1 as specified in clause A.3.15	
NR RF Channel Number		Config	1		2	
THE THE SHAFING FRANCE		1,2,3,4,5,6		•		_
Duplex mode		Config 1,4	FI	DD	-	TDD
		Config	TI	DD		TDD
		2,3,5,6				
BW _{channel}	MHz	Config 1,4		B,c = 52		N _{RB,c} = 66
		Config 2,5 Config 3,6		$B_{,c} = 52$ $B_{,c} = 106$		N _{RB,c} = 66 N _{RB,c} = 66
BWP BW	MHz	Config 1,4		$_{B,c} = 100$ $_{B,c} = 52$		N _{RB,c} = 66
BWI BW	IVII IZ	Config 2,5		$_{B,c} = 52$		$N_{RB,c} = 66$
		Config 3,6		$B_{,c} = 106$	100:	$N_{RB,c} = 66$
OCNG Patterns defined in		Config		P.1		OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-
measurement channel		Config 2,5	SR.1.	1 TDD	7	
		Config 3,6		1 TDD	7	
CORESET Reference		Config 1,4		1 FDD		-
Channel		Config 2,5	CR.1.1 TDD			
		Config 3,6		1 TDD		
TDD configuration		Config 2,5	g 2,5 TDDConf.1.1		TDD	Conf.3.1
		Config 3,6	TDDC	onf.2.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		NA	
Initial UL BWP		Config 1,2,3,4,5,6	ULBV	VP.0.1		NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBV	VP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBV	VP.1.1		NA
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SI	MTC.2
		Config 2,3,5,6	SM	TC.1	SI	MTC.1
PDSCH/PDCCH subcarrier	kHz	Config	1	15		120
spacing		1,2,4,5				
		Config 3,6	3	30		120
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS		Config				_
EPRE ratio of PDCCH DMRS to SSS		1,2,3,4,5,6	0			0
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						

EPRE ratio of PDSCH to	1				
PDSCH					
EPRE ratio of OCNG DMRS					
to SSS(Note 1)					
, ,	+				
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)	alDina /4.5			1	04.7
N _{oc} Note2	dBm/15			-1	04.7
	kHz				
	Note5				
$N_{oc}^{ m Note2}$	dBm/S	Config		-6	95.7
	CS	1,2,4,5			
	Note4	Config 3,6			95.7
SS-RSRP Note 3	dBm/S	Config		-Infinity	-86.7
	CS	1,2,4,5			
	Note5	Config 3,6		-Infinity	-86.7
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$	dB	Config		-Infinity	9
— s / – ot		1,2,3,4,5,6	NA		
\hat{E}_s/N_{oc}	dB	Config	Link only, see clause	-Infinity	9
2 s / 1 · oc		1,2,3,4,5,6	A.3.7A		
Io ^{Note3}	dBm/9.	Config		-	-
	36MHz	1,2,4,5			
	dBm/38	Config 3,6		-	-
	.16MHz	0			
	dBm/95	Config		-66.7	-57.2
	.04	1,2,3,4,5,6			
	MHz	,_,-,-,-,-			
	Note5				
Propagation Condition	113100	Config		A۱	VGN
		1,2,3,4,5,6			
N	1 1 1 1				200 1

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3 L1-RSRP measurement for beam reporting

A.5.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.5.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.1.2-1 and Table A.5.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~4		SR.3.1 TDD
RMSI CORESET Reference Channel	1~4		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~4		CCR.3.1 TDD
SSP configuration	1,2		SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2
DRX configuration	1~4		Off
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	640
T1	1~4	S	5
T2	1~4	S	1
Propagation condition	1~4		AWGN
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG	1~4	dB	0
DMRS Note 1	1~4		AWGN
Propagation condition	I~4		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Dovometer	Confin	Unit	SS	B#0	SSB#1	
Parameter	Config	Unit	T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			15.1
$N_{oc}^{ m Note2}$	1~4	dBm/15kHz		-1	05	
N_{oc} Note2	1,2	dBm/SSB SCS	-96			
TV _{oc}	3,4	ubiii/33b 3C3	-93			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~4	dB	0	0	-Infinity	9
SSB RSRP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87
COBINON	3,4	dBill/COB CCC	-93	-93	-Infinity	-84
lo Note3	1,2	dBm/95.04MHz	-67.5	-67.5	-71.1	-60.7
10	3,4	UDIII/93.04IVITZ	-67.5	-67.5	-71.1	-60.7
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9

Table A.5.6.3.1.2-2: SSB specific test parameters

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.5.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.5.6.3.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.2.2-1 and Table A.5.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4	2111	freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~4		SR.3.1 TDD
RMSI CORESET Reference Channel	1~4		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~4		CCR.3.1 TDD
SSP configuration	1,2		SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2
DRX configuration	1~4		DRX.3
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	640
T1	1~4	S	5
T2	1~4	S	1
Propagation condition	1~4		AWGN
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPPE ratio of CONC DMPS to	1~4	dB	0
EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS ^{Note 1}			
Propagation condition	1~4		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

SSB#1 **Parameter** Config Unit **T1 T1 T2 T2** Angle of arrival Setup 1 according to A.3.15.1 configuration N_{oc} Note2 1~4 dBm/15kHz -105 1,2 -96 N_{oc} Note2 dBm/SSB SCS 3,4 -93 \hat{E}_{s}/I_{ot} 1~4 0 0 -Infinity q dВ -96 -96 -87 1,2 -Infinity SSB RSRP Note3 dBm/SSB SCS -93 -Infinity 3,4 -93 -84 1,2 -67.5 -67.5 -71.1 -60.7 lo Note3 dBm/95.04MHz 3,4 -67.5 -67.5 -71.1 -60.7 1~4 dB -Infinity 0 0

Table A.5.6.3.2.2-2: SSB specific test parameters

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.5.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.3.1-1.

Table A.5.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

Config Description			
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode	
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode	
Note: Th	ne UE is only r	equired to be tested in one of the supported test configurations	

A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 160ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		26
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1~2	dB	0

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

CSI-RS#0 CSI-RS#1 **Parameter** Config Unit Angle of arrival 1~2 Setup 1 according to A.3.15.1 configuration 1~2 dBm/15kHz -105 $N_{oc}^{\rm Note1}$ 1~2 dBm/SSB SCS -95.97 \hat{E}_{s}/I_{o} 1~2 dΒ 9 0 CSI-RS RSRP 1~2 dBm/SSB SCS -95.97 -86.97 Io Note2 1~2 dBm/95.04MHz -57.47 -63.97 \hat{E}_{s}/N_{oc} 1~2 dB

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.3.3 Test Requirements

After 160ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.5.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.4.1-1.

Table A.5.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description				
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only re	equired to be tested in one of the supported test configurations				

A.5.6.3.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.4.2-1 and Table A.5.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		26
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMBC			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1~2	dB	0

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1	
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105	
Noc Note1	1~2	dBm/SSB SCS	-95.97	
\hat{E}_{s}/I_{ot}	1~2	dB	0	9
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97
lo ^{Note2}	1~2	dBm/95.04MHz	-63.97	-57.47
\hat{E}_s/N_{oc}	1~2	dB	0	9

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.7 Measurement Performance requirements

A.5.7.1 SS-RSRP

A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.5.7.1.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.1.1.2-2 and A.5.7.1.1.2-3. The E-UTRA PCell is configured as specified in

clause A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 is the target cell. The test consists of two time phases T1 and T2.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration		Description		
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	te: The UE is only required to pass in one of the supported test configurations			

Table A.5.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Duplex mode TDD TDD configuration TDDConf.3.1 TDI BWchannel MHz 100: NRB,c = 24 100: PDSCH Reference measurement channel SR.3.1 TDD TDD SR.3.1 TDD CR.3.1 TDD RMSI CORESET Reference Channel TDD TDD CCR.3.1 TDD CR.3.1 TDD CR.3.1 TDD Dedicated CORESET Reference Channel 1 TDD TDD 1 TDD 1 TDD 1 TDD OCNG Patterns OP.3 OP.3 OP.3 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1	0 freq1	
SSB ARFCN freq1 Duplex mode TDD TDD configuration TDDConf.3.1 TDI BWchannel MHz 100: NRB,c = 24 100: PDSCH Reference measurement channel SR.3.1 SR.3. SR.3. RMSI CORESET Reference Channel CR.3.1 CR.3. CR.3. Dedicated CORESET Reference Channel 1 TDD - 1 TDI OCNG Patterns OP.3 OP.3 OP.3 SSB. configuration SSB.1 SSB.1 SSB.1	freq1	
Duplex mode TDD TDD configuration TDDConf.3.1 TDI BWchannel MHz 100: N _{RB,c} = 24 100: PDSCH Reference measurement channel SR.3.1 TDD TDD SR.3.1 TDD TDD CR.3.1 TDD TDD CR.3.1 TDD TDD CR.3.1 TDD TDD Dedicated CORESET Reference Channel CCR.3. TDD TDD CCR.3. TDD TDD OCNG Patterns OP.3 OP.3 OP.3 OP.3 SSB.1 SSB.1 SSB.1 SSB.1 SSB.1		
TDD configuration		
BW _{channel}	TDD	
PDSCH Reference measurement channel	TDDConf.3.1	
PDSCH Reference measurement channel	$N_{RB,c} = 24$	
RMSI CORESET Reference Channel TDD - TDD CCR.3.	_	
Dedicated CORESET Reference Channel 1 TDD - 1 TDI OCNG Patterns OP.3 OP.3 OP.3 SSB configuration SSB.1 SSB.1 SSB.1		
SSB configuration SSB.1 SSB.1 SSB.1		
1 SSR contiduration	OP.3	
FR2 FR2 FR2	SSB.1 FR2	
SMTC configuration SMTC. SMTC. 1 1 1	SMTC.	
Time offset with Cell 2 µs - 3 -	3	
PDSCH/PDCCH subcarrier spacing kHz 120 120 120	120	
EPRE ratio of PSS to SSS		
EPRE ratio of PBCH_DMRS to SSS		
EPRE ratio of PBCH to PBCH_DMRS		
EPRE ratio of PDCCH_DMRS to SSS		
EPRE ratio of PDCCH to PDCCH_DMRS dB 0 0 0	0	
EPRE ratio of PDSCH_DMRS to SSS	0	
EPRE ratio of PDSCH to PDSCH_DMRS		
EPRE ratio of OCNG DMRS to SSS ^{Note 1}		
EPRE ratio of OCNG to OCNG DMRS Note		
Propagation conditions AWGN AWGN AWGN	N AWGN	
Antenna configuration 1x2 1x2 1x2	N I AWGIN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Note 6: Void

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

D		Unit	Т	1	T	2
Param	Parameter		Cell 2	Cell 3	Cell 2	Cell 3
	Angle of arrival configuration		Setup 1 according to clause A.3.15.1			
$N_{\!oc}$ Note1		dBm/15kH z ^{Note4}	-9 ⁻	1.6	N	/A
N_{oc} Note1		dBm/SCS Note4	-82	2.6	N	I/A
\hat{E}_s/N_{oc}	;	dB	6.0	1.0	N/A	N/A
Es		dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +3.1dB)	(Table B.2.2-2 Rx Beam Peak +3.1dB)
SSB_RP		dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +3.1dB)	(Table B.2.2-2 Rx Beam Peak +3.1dB)
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BI	$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note6 dB		2.44	-5.98	-5.98	-5.98
Io ^{Note2}	dPm/05.04		-50.05		(Table B.2.2-2 Rx Beam Peak +30.70dB)	
Note 1:		used, interfere ed in the test is				
	and sh	all be modelle	d as AWGN o	f appropriate	power for N	$\frac{1}{ac}$ to be
fulfilled. Note 2: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone						
Note 5: Note 6: Note 7:	Void Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor ∑MB _P from TS 38.101-2 [19] Table 6.2.1.3-4.					

A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 3 during T2 compared with Cell 3 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3				
	Cell 2	$SSB_RP2 - \delta + G_{min} \leqslant Reported \ RSRP(dBm) \leqslant SSB_RP2 + \delta + G_{max}$			
	Cell 3	SSB_RP3 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 + δ +G _{max}			
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zon configured in the test for the cell n under consideration				
Note 2:	2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo used in the test				
Note 3:	ote 3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class				

A.5.7.1.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.1.2.1-1.

Table A.5.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.5.7.1.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Unit Test 1 Test 2			
	_	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~4		freq1	freq2	freq1	freq2
BWchannel	1~4			00: = 24	100: N _{RB,c} = 24	
Duplex mode	1~4		TDD	TDD	TDD	TDD
TDD configuration	1~4		TDDC	onf.3.1	TDDC	onf.3.1
PDSCH Reference measurement channel	1~4		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel	1~4		CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Reference Channel	1~4		CCR.3.1 TDD	-	CCR.3.1 TDD	-
SSB configuration	1,2			1 FR2		1 FR2
	3,4			2 FR2		2 FR2
OCNG Patterns	1~4			P.3		P.3
Initial BWP Configuration	1~4			/P.0.1		/P.0.1
Dedicated BWP			ULBWP.0.1 DLBWP.1.3		ULBWP.0.1 DLBWP.1.3	
configuration	1~4		ULBWP.1.3		ULBWP.1.3	
TRS Configuration	1~4			.1 TDD	TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~4			tate.2	TCI.State.2	
SMTC configuration	1~4		SM	ΓC.1	SMTC.1	
Time offset between Cell 2 and Cell 3	1~4	μs	;	3	3	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG to EPRE ratio of OCNG to	1~4	dB	0	0	0	0
OCNG DMRS Note 1 Propagation condition	1~4	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~4	-	1x2	1x2	1x2	1x2

Antenna configuration | 1~4 | - | 1x2 | 1x2 | 1x2 |

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.5.7.1.2.2-2: SS-RSRP inter-frequency OTA related test parameters

Poromotor	Unit	Tes	st 1	Test 2	
Parameter	Ullit	Cell 2 Cell 3		Cell 2	Cell 3

Angle of arrival			Setup 4b according to clause A.3.15.4.2		Setup 4b according to clause A.3.15.4.2	
configuration		AoA1 Spherical coverage	AoA2 Rx Beam Peak	Spherical coverage	Rx Beam Peak	
N _{oc} Note1 dBm/15kH zNote4		-90.6	-90.6	(Table B.2.3-2 Rx Beam Peak +1.97dB)	(Table B.2.3-2 Rx Beam Peak - 3.03dB)	
$N_{oc}^{}$ Note1	dBm/SCS Note4	-81.6	-81.6	(Table B.2.3-2 Rx Beam Peak +11.0dB)	(Table B.2.3-2 Rx Beam Peak +6.0dB)	
\hat{E}_s/N_{oc}	dB	6.0	6.0	17.0	-1.0	
SSB_RPNote2	dBm/SCS	-75.60	-75.60	(Table B.2.3-2 Rx Beam Peak +28.0dB)	(Table B.2. 3-2 Rx Beam Peak +5.0dB)	
(SSB_RP _{Cell 2}) dB		0		23.00		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note6			5.96	8.86	-3.92	
Io ^{Note2} dBm/95.04 MHz ^{Note4}		-50.03	-50.03	(Table B.2.3-2 Rx Beam Peak +52.68dB)	(Table B.2.3-2 Rx Beam Peak +33.13dB)	
(IOfreq 1 - IO freq 2)	dB	(•		.55	
	used, interfered and in the test is					
	all be modelle	d as AWGN o	of appropriate	power for N	$_{oc}$ to be	
fulfilled. Note 2: SSB_RP, Es/lot, Io, (SSB_RPcell 2 – SSB_RPcell 1) and (Iofreq 2 – Io freq 1) levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of						
Note 4. Equivalent power received by an anierina with 0 dBr gain at the centre of the quiet zone Note 5: Void Note 6: Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor ∑MB _P or ∑MB _S from TS 38.101-2 [19] Table 6.2.1.3-4.						

A.5.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Table A.5.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3,4					
	Cell 2	SSB_RP2 - δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}				
	Cell 3	SSB_RP3 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 + δ +G _{max}				
Note 1:		quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone st for the cell n under consideration				
Note 2:	<u> </u>					
Note 3:	e 3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class					
Note 4:		coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating a negative value.				

Table A.5.7.1.2.3-2: SS-RSRP relative accuracy test requirement

	Test requirement Notes1,2,3,4				
Cell 3 – Cell 2		SSB_RP3 - SSB_RP2 - δ ≤ Reported RSRP(dB) ≤ SSB_RP3 - SSB_RP2 + δ -(X)			
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet z configured in the test for the cell n under consideration					
Note 2: Note 3:					
Note 4:					

A.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	bandwidth, TDD duplex mode
	bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	
Note: The U	JE is only required to be tested in one of the su	pported test configurations

A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Doromotor	Confin	Unit	Test 1		Test 2	
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N _{RB,c} = 52		10: N _{RB,c} = 52	
BWchannel	2,5	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	10: N _{RB,c} = 52	100: N _{RB,c} = 66
	3,6		40: N _{RB,c} = 106		40: N _{RB,c} = 106	
Gap pattern ID			()	()
	1,4		FDD		FDD	ļ
Duplex mode	2,5		TDD	TDD	TDD	TDD
-	3,6		TDD		TDD	
TDD configuration	1,4		N/A		N/A	
	2,5		TDDConf. 1.1	TDDConf.	TDDConf. 1.1	TDDConf.
, and the second	3,6		TDDConf. 2.1	3.1	TDDConf. 2.1	3.1
DD00HD-f	1,4		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
measurement channel	3,6		SR.2.1 FDD		SR.2.1 FDD	
DMOLOODEOET	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
Reference Channel	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-
Dadia da do ODEOET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Dedicated CORESET Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-
SSB configuration	1,4		SSB.1 FR1	SSB.1	SSB.1 FR1	SSB.1
COD Configuration	2,5		SSB.1 FR1	FR2	SSB.1 FR1	FR2

	3,6		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~6		OF	P.1	OF	P.1
Initial BWP Configuration	1~6			/P.0.1 /P.0.1	DLBW ULBW	
Dedicated BWP configuration	1~6		ULBW	/P.1.3 /P.1.3		/P.1.3 /P.1.3
TRS Configuration	1~6		TRS.2	.1 TDD	TRS.2	.1 TDD
PDCCH/PDSCH TCI Configuration	1~6		TCI.S	tate.2	TCI.S	tate.2
SMTC configuration	1~6		SMT	ΓC.1	SMT	ΓC.1
Time offset between Cell 2 and Cell 3	1~6	μs	3	3	3	3
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG to OCNG DMRS OCNG DMRS	1~6	dB	0	0	0	0
Propagation condition	1~6	-	NA	AWGN	NA	AWGN
Antenna configuration	1~6	-	Link only, see clause A.3.7A	1x2	Link only, see clause A.3.7A	1x2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Parameter Config Unit Cell 2 Cell 3 Cell 2 Cell 3 Angle of arrival configuration **TBD TBD** dBm/15 N_{oc} 1~4 TBD NA kHz 1,2 TBD NA dBm/SS N_{oc} 3,4 **B SCS** TBD NA \hat{E}_{s}/I_{o} 1~4 dB **TBD** NA NA NΑ As in Link only, Link only, **TBD** 1,2 Table dBm/SC see see B.2.3-2 SS-RSRPNote1 clause clause S As in A.3.7A A.3.7A 3.4 **TBD** Table B.2.3-2 dBm/ SS-Io^{Note1} 1~4 95.04M TBD RSRP+ Hz 28.98 \hat{E}_{s}/N_{o} 1~4 dB **TBD** NA

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Note 1: RSRP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise

at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.5.7.2 SS-RSRQ

A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Co	nfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		l lmit	Test	:1	Test 2		
Par	ameter	Unit	Cell 2 Cell 3		Cell 2	Cell 3	
SSB ARFCN			Fred	1	Fre	eq1	
Duplex mode			TDI	D	TE	DD	
TDD configuration			TDDCo		TDDC		
BW _{channel}		MHz	100: N _{RB}		100: N _R	$_{\rm B,c} = 66$	
	Initial DL BWP				VP.0.1		
BWP configuration	Dedicated DL BWP			DLB\	VP.1.1		
DVVI configuration	Initial UL BWP				VP.0.1		
	Dedicated UL BWP			ULB\	<u>WP.1.1</u>		
TRS configuration			TRS.2.1		TRS.2.1		
Tree configuration			TDD		TDD		
TCI state			TCI.State		TCI.State		
			.0		.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
			TDD		TDD		
RMSI CORESET R	eference Channel		CR.3.1	-	CR.3.1 TDD	-	
			TDD CCR.3.1		CCR.3.1		
Control channel RMC			TDD	-	TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration	1		SMTC.1				
			SSB.1	SSB.1	SSB.1	SSB.1	
SSB configuration			FR2	FR2	FR2	FR2	
PDSCH/PDCCH su	bcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measuren	nent		Not Applicable				
EPRE ratio of PSS							
EPRE ratio of PBCI							
EPRE ratio of PBCI							
EPRE ratio of PDC							
	CH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS		uВ	U	U	U	O	
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
EPRE ratio of OCNG to OCNG DMRS Note 1							
\hat{E}_s/N_{oc}		dB	3	3	-3	-3	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Void

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

Note 7: Note 8:

Void

Parameter	Unit	Tes		Test 2			
i diametei	Oilit	Cell 2	Cell 3	Cell 2 Cell 3 Setup 1 according to			
Angle of arrival configuration			Setup 1 according to clause A.3.15.1		A.3.15.1		
$N_{oc}^{}$ Note1	dBm/15kHz ^N ote4	-95		-95			
$N_{oc}^{}$ Note1	dBm/SCS ^{Note}	-86				-8	36
SS-RSRP ^{Note2}	dBm/SCS Note4	-83	-83	-89	-89		
SS-RSRQ ^{Note2}	dB	-14.77 -14.77		-16.81	-16.81		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-1.76	-1.76	-4.76	-4.76		
IoNote2	dBm/95.04 MHz ^{Note4}	-5	0	54	-54		
Note 1: Interference from other cells and over subcarriers and time and she fulfilled. Note 2: SS-RSRQ, SS-RSRP, and lo leve purposes. They are not settable. Note 3: SS-RSRQ and SS-RSRP miniment and noise at each receiver anter. Note 4: Equivalent power received by an Note 5: As observed with 0dBi gain ante. Note 6: NR operating band groups are a	rels have been de parameters them um requirements in a port. In antenna with 0d nna at the centre	as AWGN of a selves. are specified are the first the quiet	f appropria other parar ed assumin ne centre of	te power for I meters for info	N_{oc} to be rmation tinterference		

A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -3.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -4.5dB according to the requirements in clause 10.1.8.1.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3. The SS-RSRQ relative measurement accuracy shall meet the requirements in clause 10.1.8.1.1.

A.5.7.2.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.5.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.5.7.2.2.2: SS-RSRQ Inter frequency general test parameters

Linit	Tes	st 1	Test 2		
Unit	Cell 2	Cell 3	Cell 2	Cell 3	
	Freq1	freq2	freq1	Freq2	
	TE	DD	T	DD	
	TDDC	onf.3.1	TDDC	onf.3.1	
MHz	100: N _F	$_{\rm B,c} = 66$	100: N _F	$_{RB,c} = 66$	
	SR.3.1 TDD	-	SR.3.1 TDD	-	
	CR.3.1 TDD	-	CR.3.1 TDD	-	
	OP.1	OP.1	OP.1	OP.1	
	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	
kHz	120	120	120	120	
dB	0	0	0	0	
1	-				
dB	-1.75	-1.75	-3	-3	
oth cells are fully	allocated	and a cons	stant total		
	dB dB oth cells are fully y is achieved fo noise sources n	TCell 2 Freq1 TDDC MHz 100: N _F SR.3.1 TDD CR.3.1 TDD OP.1 SMTC. 1 FR2 kHz 120 dB 0 dB -1.75 oth cells are fully allocated by is achieved for all OFDM noise sources not specified	Cell 2 Cell 3 Freq1 freq2 TDD TDDConf.3.1 MHz 100: N _{RB,c} = 66 SR.3.1 TDD - CR.3.1 TDD - OP.1 OP.1 SMTC. SMTC. 1 FR2 1 FR2 kHz 120 120 dB -1.75 -1.75 oth cells are fully allocated and a consty is achieved for all OFDM symbols. noise sources not specified in the test	Cell 2 Cell 3 Cell 2 Freq1 freq2 freq1 TDD	

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Doromotor	Unit	Te	st 1	Test 2		
Parameter		Cell 2	Cell 3	Cell 2	Cell 3	

Note 6: Note 7:

Void

AoA setup			in clause e A.3.15	Setup 1 in clause in clause A.3.15		
N_{oc}^{- Note1	dBm/15kHz ^N ote4	-94	.03	-94.03		
$N_{oc}^{}$ Note1	dBm/SCS ^{Note}	-85.0		-85.0		
SSB_RP ^{Note2}	dBm/SCS Note4	-86.75 -86.75		-88	-88	
SS-RSRQ ^{Note2}	dB	-14.75 -14.75		-15.56	-15.56	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-1.75	-1.75	-3	-3	
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25	
 Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: Void 						

A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-3.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-4.5dB according to the requirements in clause 10.1.10.1.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.5.7.3 SS-SINR

A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Co	onfiguration	Description				
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations						

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Tes	st 1	Test 2		
Parameter	Unit	Cell 2 Cell 3		Cell 2	Cell 3	
SSB ARFCN		Freq2		Freq2		
Duplex mode			DD D	TDD		
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,c = 66	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration			DLBV	VP.1.1		
Uplink initial BWP configuration				VP.0.1		
Uplink dedicated BWP configuration				VP.1.1		
DRX cycle configuration	ms		Not ap	plicable		
TRS configuration				.1 TDD		
TCI state				State.0		
AoA setup			etup 3 defi	ned in A.3.	15	
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
1 DOOT I Reference measurement charmer		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1	_	
		TDD	_	TDD	_	
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_	
Channel		.1 TDD		1 TDD		
OCNG Patterns		OP.1 OP.1		OP.1	OP.1	
SMTC configuration				TC.1		
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	
		FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measurement			Not Ap	plicable	1	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS	uБ	U	U	U	U	
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS ^{Note 1}						
EPRE ratio of OCNG to OCNG DMRS Note 1						
\hat{E}_s/N_{oc}	dB	4.54	2.66	-3	-3	
3, 00						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

		Tor	st 1	Tor	et 2		
Parameter	Unit	Cell 2	Cell 3	Test 2 Cell 2 Cell 3			
Angle of arrival configuration		Set	up 1 ding to	Setup 1 according to clause A.3.15.1			
$N_{\it oc}$ Note1	dBm/15kHz Note4	-105		-1			
N _{oc} Note1	dBm/SCS Note3	-96		96 -96			
SS-RSRP ^{Note2}	dBm/SCS Note4	-91.46	-91.46 -93.34		-99		
SS-SINR Note2	dB	0 -3.2		-4.76	-4.76		
\hat{E}_s/I_{ot}	dB	0	-3.2	-4.76	-4.76		
IoNote2	dBm/95.04 MHz Note4	-59	9.2	-64			
Note 1: Interference from other cells and constant over subcarriers and tim for N_{oc} to be fulfilled.							
Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Clause 3.5.2.							
Note 7: Void Note 8: Void		- 5 0.0.2.					

A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -4dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -4.5dB according to the requirements in clause 10.1.10.13.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.13.1.1.

A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.5.7.2.2.2-2: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.2.2.2-2: SS-SINR Inter frequency general test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2
Duplex mode		TDD		TDD		T	DD
TDD configuration		TDDConf.3.1		TDDConf.3.1		3.1 TDDConf.	
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,c = 66	100: N _{RB,c} = 60	
Downlink initial BWP configuration				DLBV	/P.0.1		
Downlink dedicated BWP configuration				DLBV	/P.1.1		
Uplink initial BWP configuration				ULBV	/P.0.1		
Uplink dedicated BWP configuration				ULBV	/P.1.1		
DRX cycle configuration	ms				olicable		
TRS configuration				TRS.2	.1 TDD		
TCI state					tate.0		
AoA setup			Se	etup 3 defii	ned in A.3.		
		SR.3.1		SR.3.1		SR.3.1	
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
<u>^</u> /							
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.5.7.2.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
raiailletei		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1			
$N_{\it oc}^{ m Note1}$	dBm/15kHz Note4	-105		-105 -105		-105		-1	05
$N_{\it oc}$ Note1	dBm/SCS Note3	-96		-96		-96			
SS-RSRPNote2	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99		
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0		
\hat{E}_s/I_{ot}	dB	-0.5	-0.5	11	11	-3.0	-3.0		
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-69.3		-55.4		-65	i.24		

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in Clause 3.5.2.
- Note 7: Void Note 8: Void Note 9: Void

A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR -4dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -4.5dB according to the requirements in clause 10.1.15.1.1 with an additional -1dB margin

reflecting the possible impact of UE self noise in the test. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.5.7.4 L1-RSRP measurement for beam reporting

A.5.7.4.1 SSB based L1-RSRP measurement

A.5.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.5.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations in each supported band					

A.5.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.5.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~4		freq1	freq1
Duplex mode	1~4		TDD	TDD
TDD Configuration	1~4		TDDConf.3.1	TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~4		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~4		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~4		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1,2		SSB.1 FR2	SSB.1 FR2
	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~4		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2	TCI.State.2
SMTC configuration	1~4		SMTC.1	SMTC.1
reportConfigType	1~4		periodic	periodic
reportQuantity	1~4		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~4		2	2
L1-RSRP reporting period	1~4		slot640	slot640
Propagation condition	1~4		AWGN	AWGN
Antenna configuration			1x2	1x2
EPRE ratio of PSS to SSS			.,,	17.2
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS			_	
EPRE ratio of PDSCH DMRS to SSS	1~4	dB	0	0
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to	1			
SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for $\frac{N_{oc}}{}$ to be fulfilled.

Test 2 NOTE 3 **Parameter** Config Unit SSB0 SSB1 SSB0 SSB1 Setup 1 according to Angle of arrival configuration Setup 1 according to A.3.15.1 A.3.15.1 dBm/15 N_{oc} 1~4 -100 n.a. kHz 1.2 -91 dBm/SS n.a. N_{oc} **B SCS** 3,4 -88 n.a. \hat{E}_{s}/I_{d} -2 1~4 dB 10 n.a. 1,2 dBm/SC -81 -93 As in Table B.2.4-2 SS-RSRPNote1 -78 -90 As in Table B.2.4-2 3,4 S dBm/ -51.57 Io^{Note1} 95.04M SS-RSRP+28.98 1~4 Hz

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

dB RSRP and lo levels have been derived from other parameters for information purposes. Note 1: They are not settable parameters themselves.

RSRP minimum requirements are specified assuming independent interference and noise Note 2:

10

-2

at each receiver antenna port.

No additional noise is added by the test system in Test 2. Note 3:

1~4

A.5.7.4.1.3 **Test Requirements**

 \hat{E}_s/N_{oc}

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

A.5.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.5.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.5.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description				
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band				

A.5.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.5.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
CSI-RS	1~2		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		cri-RSRP	cri-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot640	slot640
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG	1~2	dB	0	0
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

						st 1	Test 2 NOTE 3	
Parameter	Config	Unit	CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1		
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 acc	_		
			A.3.	15.1	A.3.1	5.1		
N_{oc}	1~2	dBm/15 kHz	-100		n.a.			
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.			
\hat{E}_{s}/I_{ot}	1~2	dB	10	-2	n.a.			
CSI-RS-RSRP ^{Note1}	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2			
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-59.86 SS-RSRP+2		°+28.98			
\hat{E}_s/N_{oc}	1~2	dB	-51.57	-2	n.a	l.		

Note 1: RSRP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise

at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.5.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.2. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]dB$.

A.5.8 Void

A.6 NR standalone tests with all NR cells in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

Cor	nfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final condition	Active cell		1, 2, 3	Cell1	
RF Channe	el Number		1, 2, 3	1	
Time offse	ime offset between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	SMTC configuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
				pattern 1	

DRX cycle length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell		1, 2, 3	Not configured	
T1	S	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2	S	1, 2, 3	40	T2 needs to be defined so that cell re- selection reaction time is taken into account.
Т3	S	1, 2, 3	15	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			N/A	
		2		DDConf.1.		TDDConf.1.1		
		3	TDDConf.2.1			TI	DDConf.2.	.1
PDSCH RMC		1	S	R.1.1 FDD	1		N/A	
configuration		2	S	R.1.1 TDD	1			
		3	S	R.2.1 TDD)			
RMSI CORESET		1		R.1.1 FDD)	C	R.1.1 FDI	D
RMC configuration		2	C	R.1.1 TDD)	C	R.1.1 TDI	D
		3		R.2.1 TDD	1	C	R.2.1 TDI	D
Dedicated CORESET		1	С	CR.1.1 FDI)	C	CR.1.1 FD	D
RMC configuration		2	С	CR.1.1 TDI)	C	CR.1.1 TD)D
		3	С	CR.2.1 TDI)	C	CR.2.1 TD)D
OCNG Pattern		1, 2, 3	OP.1 c	defined in A	3.2.1	OP.1 d	efined in /	A.3.2.1
Initial DL BWP		1, 2, 3	Γ	DLBWP.0.1			LBWP.0.	1
configuration								
Initial UL BWP		1, 2, 3	l	JLBWP.0.1		L	JLBWP.0.	1
configuration								
RLM-RS		1, 2, 3		SSB		SSB		
Qrxlevmin	dBm/SCS	1, 2		-140		-140		
		3		-137		-137		
Pcompensation	dB	1, 2, 3		0		0		
Qhysts	dB	1, 2, 3		0		0		
Qoffsets, n	dB	1, 2, 3		0		0		
Cell_selection_and_		1, 2, 3						
reselection_quality_				SS-RSRP		;	SS-RSRP	
measurement								
\hat{E}_{s}/I_{ot}	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
3 / Ot		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
TV _{OC} Note2		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
TV _{OC} Note2		2						
		3						
\hat{E}_{s}/N_{oc}	dB	1	16	13	16	-infinity	16	13
s / Oc		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
lo	dBm/9.36 MHz	1	-53.94 -52.21 -52.21 pecified in Ce					
	dBm/9.36 MHz	2	-53.94 -52.21 -52.21					
	dBm/38.16 MHz	3	-47.85	-46.12	-46.12	1		
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3		N50			N50	
Propagation		1, 2, 3			AWG	N		
Condition								

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers Note 2:

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

A.6.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{detect, NR_Intra} + T_{SI-NR}$, and to an already detected cell can be expressed as: $T_{evaluate, NR_intra} + T_{SI-NR}$,

Where:

 $T_{\text{detect, NR_Intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\ T_{\text{evaluate, NR_intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\$

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s for the cell re-selection delay to an already detected cell in the test case, which we allow 8 s.

A.6.1.1.2 Cell reselection to FR1 inter-frequency NR case

A.6.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.6.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.2.2-1, A.6.1.1.2.2-2 and A.6.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.6.1.1.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD			
duplex mode		duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode	duplex mode			
3 30 kHz SSB SCS, 40 MHz bandwidth, TDD		30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment
Initial	Active cell		configuration 1, 2, 3	Cell2	The UE camps on cell 2 in the initial
condition			1, 2, 0		phase and during T1 period the UE reselects to cell 1
T1 end	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3	Cell2	during T1
T3 end condition	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
RF Channe			1, 2, 3	1, 2	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 µs	Synchronous cells
	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC	
			_	pattern 2	
			2	SMTC	
			3	pattern 1 SMTC	
			3	pattern 1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2, 3	Not configured	
T1		S	1, 2, 3	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2, 3	75	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Test Cell 1				Cell 2																																				
		configuration	T1	T2	T3	T1	T2	T3																																			
TDD configuration		1	N/A		N/A N/A																																						
		2	TDDConf.1.1		TDDConf.1.1																																						
		3	TDDConf.2.1		TDDConf.2.1		1																																				
PDSCH RMC		1	;	SR.1.1 FDD N/A		N/A																																					
configuration		2	SR.1.1 TDD																																								
		3	SR.2.1 TDD																																								
RMSI CORESET		1	CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		C	R.1.1 FDD	
RMC configuration		2	CR.1.1 TDD			CR.1.1 TDD CR.1.1 TDD)																																			
		3	CR.2.1 TDD			C	R.2.1 TDD)																																			

Dedicated CORESET		1	CCR.1.1 FDD CCR.1.1 FDI					D	
RMC configuration		2		CCR.1.1 TDD			CCR.1.1 TDD		
lgg	-	3		CR.2.1 TDI			CR.2.1 TD		
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1			
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.		
configuration		., _, 0	_			_		•	
Initial UL BWP		1, 2, 3	ι	JLBWP.0.1		Į	JLBWP.0.	1	
configuration		, , -		-			_		
RLM-RS		1, 2, 3		SSB			SSB		
Qrxlevmin	dBm/SCS	1, 2		-140			-140		
·		3		-137			-137		
Pcompensation	dB	1, 2, 3		0			0		
Qhysts	dB	1, 2, 3		0			0		
Qoffsets, n	dB	1, 2, 3		0			0		
Cell_selection_and_		1, 2, 3							
reselection_quality_				SS-RSRP			SS-RSRP		
measurement									
\hat{E}_{s}/I_{ot}	dB	1	14	14	14	-4	-infinity	12	
s / ot		2							
		3							
N Note2	dBm/SCS	1	-98						
N_{oc} Note2		2			-98				
		3			-95				
N Note?	dBm/15 kHz	1			-98				
N_{oc} Note2		2							
		3							
\hat{E}_{s}/N_{oc}	dB	1	14	14	14	-4	-infinity	12	
3 7 00		2							
		3							
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-86	
		2	-84	-84	-84	-102	-infinity	-86	
		3	-81	-81	-81	-99	-infinity	-83	
lo	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60	-infinity	-57.78	
	dBm/9.36 MHz	2	-55.88	-55.88	-55.88	-68.60	-infinity	-57.78	
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50	-infinity	-51.69	
Treselection	S	1, 2, 3	0	0	0	0	0	0	
Snonintrasearch	dB	1, 2, 3		50			Not sent		
Thresh _{x, high}	dB	1, 2, 3		48			48		
Thresh _{serving, low}	dB	1, 2, 3		44			44		
Thresh _{x, low}	dB	1, 2, 3		50			50		
Propagation Condition		1, 2, 3			AWG	N			

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

 $T_{higher_priority_search} \qquad See \ clause \ 4.2.2.7$

T_{evaluate, NR_ inter} See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	·
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition					phase and during T2 period the UE reselects to cell 2.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T2.
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	during T3 for iteration of the tests.
Access Ba	rring Information	1	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACE	NR PRACH configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN index	PRACH configuration		1, 2, 3, 4, 5, 6	4	As specified in table 5.7.1-2 in TS 36.211 [23]
T1		S	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.
T2		Ø	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ		S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.6.1.2.1.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1			
		_	T1	T2	T3	
TDD configuration		1, 4	N/A			
		2, 5	T	DDConf.1	1.1	
		3, 6	T	DDConf.2	2.1	
PDSCH parameters		1, 4	,	SR.1.1 FD	D	
		2, 5	•	SR.1.1 TD	D	
		3, 6	Ç	SR.2.1 TD	D	
RMSI CORESET		1, 4	(CR.1.1 FD	D	
parameters	ameters 2, 5		(CR.1.1 TDD		
		3, 6	(CR.2.1 TD	D	
Dedicated CORESET		1, 4	C	CR.1.1 FI	OD	
parameters		CCR.1.1 TDD				
		3, 6	O	CR.2.1 TI	OD	
SSB parameters		1, 4		SSB.1 FR	.1	
		2, 5		SSB.1 FR	.1	
		3, 6		SSB.2 FR	1	
NR SMTC parameters		1, 4	SMTC pattern 2			
	_	2, 5	SN	MTC patte	rn 1	
	_	3, 6	SN	MTC patte	rn 1	

OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 d	lefined in	A.3.2.1
Initial DL BWP configuration		1, 2, 3, 4, 5, 6		DLBWP.C)
Initial UL BWP configuration		1, 2, 3, 4, 5, 6		ULBWP.0	
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
M	dBm/SCS	1, 4		-98	
N_{oc}		2, 5		-98	
		3, 6		-95	
N_{oc}	dBm/15 kHz	3, 6 1, 2, 3, 4, 5, 6		-98	
SS-RSRP	dBm/SCS	1, 4	-84	-84	-84
		2, 5	-84	-84	-84
		3, 6	-81	-81	-81
\hat{E}_{s}/I_{ot}	dB	1, 4	14	14	14
— s / - ot		2, 5			
		3, 6			
\hat{E}_s/N_{oc}	dB	1, 4	14	14	14
- s / - · oc		2, 5			
		3, 6			
lo	dBm/9.36 MHz	1, 4	-55.88	-55.88	-55.88
	dBm/9.36 MHz	2, 5	-55.88	-55.88	-55.88
	dBm/38.16 MHz	3, 6	-49.79	-49.79	-49.79
Treselection	S	1, 2, 3, 4, 5, 6		0	
Snonintrasearch	dB	1, 2, 3, 4, 5, 6		50	
Thresh _{x, high (Note 2)}	dB	1, 2, 3, 4, 5, 6		48	
Thresh _{serving, low}	dB	1, 2, 3, 4, 5, 6		44	
Thresh _{x, low}	dB	1, 2, 3, 4, 5, 6		50	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	

Note 2: This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit		Cell 2	
		T1	T2	Т3
E-UTRA RF Channel			1	
number				
BW _{channel}	MHz		10	
OCNG Patterns defined in		OP.	2 TDD for	test
TS 36.133 [15] clause A.3.2		config	guration 1	, 2, 3;
			2 FDD for	
		confi	guration 4	, 5, 6
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB			
PHICH_RB	dB		0	
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA ^{Note 1}	dB			
OCNG_RBNote 1	dB			

Qrxlevmin	dBm	-140		
N_{oc}	dBm/15 kHz	-98		
RSRP	dBm/15 KHz	z -infinity -86		-102
\hat{E}_s/I_{ot}	dB	-infinity	12	-4
\hat{E}_s/N_{oc}	dB	-infinity	12	-4
TreselectionEUTRAN	S	0		
Snonintrasearch	dB	Not sent		
Thresh _{x, high (Note 2)}	dB	48		
Thresh _{serving, low}	dB	44		
Thresh _{x, low}	dB	50		
Propagation Condition			AWGN	

Note 2: This refers to the value of Thresh_{x, high} which is included in E-UTRA system information, and is a threshold for the NR target cell

A.6.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

Thigher_priority_search See clause 4.2.2.7

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of three successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter		Test configuration	Value	Comment	
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase.	
T1 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2	
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T1.	
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1	
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	during T2 for iteration of the tests.	
Access Ba	Access Barring Information		1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random acces procedure.	
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.	
NR PRACE	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2	
E-UTRAN index	E-UTRAN PRACH configuration index		1, 2, 3, 4, 5, 6	4	As specified in table 5.7.1-2 in TS 36.211 [23]	
T1		Ø	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.	
T2	T2		1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.	

Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1		
		J	T1	T2	
TDD configuration		1, 4	N//	4	
		2, 5	TDDCo	nf.1.1	
		3, 6	TDDCo	nf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1		
		2, 5	SR.1.1	TDD	
		3, 6	SR.2.1		
RMSI CORESET RMC		1, 4	CR.1.1	FDD	
configuration		2, 5	CR.1.1	TDD	
		3, 6	CR.2.1	TDD	
Dedicated CORESET RMC		1, 4	CCR.1.	1 FDD	
configuration		2, 5	CCR.1.		
		3, 6	CCR.2.	1 TDD	
SSB configuration		1, 4	SSB.1	FR1	
		2, 5	SSB.1	FR1	
		3, 6	SSB.2	FR1	
SMTC configuration		1, 4	SMTC pa	attern 2	
		2, 5	SMTC pa	attern 1	
		3, 6	SMTC pa	attern 1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBW		
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0		
RLM-RS		1, 2, 3, 4, 5, 6	SSB		
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140		
		3, 6	-13	7	
N_{oc}	dBm/SCS	1, 4	-98	3	
1 voc		2, 5	-98	3	
		3, 6	-98		
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	3	
SS-RSRP	dBm/SCS	1, 4	-102	-86	
		2, 5	-102	-86	
		3, 6	-99	-83	
Ê _s /I _{ot}	dB	1, 4	-4	12	
s / ot		2, 5			
		3, 6			
\hat{E}_s/N_{gc}	dB	1, 4	-4	12	
37 00		2, 5			
		3, 6			
lo	dBm/9.36 MHz	1, 4	-68.60	-57.78	
	dBm/9.36 MHz	2, 5	-68.60	-57.78	
	dBm/38.16 MHz	3, 6	-62.50	-51.69	
Treselection	S	1, 2, 3, 4, 5, 6	0		
Snonintrasearch	dB	1, 2, 3, 4, 5, 6	50		
Thresh _{x, high (Note 2)}	dB	1, 2, 3, 4, 5, 6	48		
Thresh _{serving, low}	dB	1, 2, 3, 4, 5, 6	44		
Thresh _{x, low}	dB	1, 2, 3, 4, 5, 6	50		
Propagation Condition	1, 2, 3, 4, 5, 6 AWGN				

Note 2: This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Ce	ell 2	
		T1	T2 T3	
E-UTRA RF Channel			1	
number				
BW _{channel}	MHz		0	
OCNG Patterns defined in		OP.2 TD	D for test	
TS 36.133 [15] clause A.3.2		configura	tion 1, 2, 3;	
		OP.2 FD	D for test	
		configura	tion 4, 5, 6	
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB		•	
PHICH_RB	dB		0	
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA ^{Note 1}	dB			
OCNG_RB ^{Note 1}	dB			
Qrxlevmin	dBm	-1	40	
N_{oc}	dBm/15 kHz	-1	98	
RSRP	dBm/15 KHz	-84	-84	
\hat{E}_{s}/I_{ot}	dB	14	14	
\hat{E}_s/N_{oc}	dB	14 14		
TreselectionEUTRAN	S	0		
Snonintrasearch	dB	Not sent		
Thresh _x , high (Note 2)	dB	48		
Thresh _{serving, low}	dB	44		
Thresh _{x, low}	dB	50		
Propagation Condition	n Condition AWGN			
Note 1. OCNIC shall be use	all accords the at head to	H f - H -	all a a a table	

Note 2: This refers to the value of Thresh_x, high which is included in E-UTRA system information, and is a threshold for the NR target

cell

A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: T_{evaluate, E-UTRAN} + T_{SI-E-UTRA},

Where:

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.2 SA: RRC_INACTIVE state mobility

A.6.3 RRC_CONNECTED state mobility

A.6.3.1 Handover

A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell

A.6.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.1.2-2, and A.6.3.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.6.3.1.1.2-1: Intra-frequency handover from FR1 to FR1 test configurations

	Config	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only i	equired to be tested in one of the supported test configurations

Table A.6.3.1.1.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	formation	-	Not Sent	No additional delays in random
				access procedure.
PRACH configuration index			FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-
				3 in TS 38.211 [6]
Time offset between cells			3 us	Synchronous cells

T1	S	5	
T2	s	≤5	
T3	S	1	

Table A.6.3.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

NR RF Channel Number	Devening		l lmi4		Cell 1		Cell 2			
Duplex mode	Param	eter	Unit	T1	T2	Т3	T1	T2		T3
Duplex mode	NR RF Channel Numbe	Ť			1	•		1		
Config 2	Dunlay made	Config 1								
TDD configuration	Duplex mode	Config 2,3]			TE	DD			
Config 3		Config 1				Not App	olicable			
Config 3	TDD configuration									
BWchannel	· ·									
BWchannel		Config 1				10: N _{RE}	_{3.c} = 52			
Config 3	BW _{channel}	Config 2	MHz			10: N _{RE}	3,c = 52			
Config 1						40: N _{RB}	_{,c} = 106			
DRX Cycle		Config 1				10: N _{RE}	_{3,c} = 52			
DRX Cycle	BWP BW		MHz			10: Nr	3,c = 52			
DRX Cycle						40: N _{RB}	.c = 106			
PDSCH Reference measurement channel	DRx Cycle		ms							
Config 2 SR.1.1 TDD	-	Config 1								
Config 3 SR2.1 TDD										
CORESET Reference Channel Config 1	measurement channel									
Config 2 Config 3 CR.1.1 TDD										
Config 3 CR2.1 TDD										
Config 1	Channel									
TRS configuration										
Config 3	TRS configuration									
OCNG Patterns OCNG pattern 1 SMTC Configuration SMTC pattern 1 SSB Configuration Config 1,2 SSB.1 FR1 SSB.1 FR1 PDSCH/PDCCH Config 1,2 SSB.2 FR1 PDSCH/PDCCH Config 1,2 KHz subcarrier spacing Config 3 KHz PUCCH/PUSCH Config 1,2 KHz subcarrier spacing Config 3 KHz PRACH configuration FR1 PRACH configuration 1 BWP configuration DLBWP.0.1 Dedicated DL BWP DLBWP.0.1 BWP DLBWP.0.1 Dedicated UL BWP ULBWP.0.1 BWP ULBWP.0.1 Dedicated UL BWP ULBWP.1.1 BWP ULBWP.1.1 BWP ULBWP.0.1 DER ratio of PDSCH to PDCCH DMRS BREFE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS BREFE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) BREFE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG DMRS to SSS(Note 1) BREFE ratio of PDSCH to PDSCH	Trib sermigaraner.									
SMTC Configuration	OCNG Patterns	Comig C								
SSB Configuration										
Config 3 SSB.2 FR1	•	Config 1.2								
PDSCH/PDCCH Subcarrier spacing Config 1,2 Config 3 30 kHz	SSB Configuration									
subcarrier spacing Config 3 KHZ 30 kHz PUCCH/PUSCH subcarrier spacing Config 1,2 kHz 15 kHz SUBCARTIER Spacing Config 3 KHZ 30 kHz PRACH configuration Initial DL BWP PRACH configuration 1 BWP configuration DLBWP.0.1 DLBWP.0.1 Dedicated DL BWP DLBWP.1.1 BWP ULBWP.0.1 Initial UL BWP ULBWP.0.1 Dedicated UL BWP ULBWP.1.1 BWP ULBWP.1.1 BEPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH border DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH border DMRS to SSS EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of PDSCH border DMRS ABM/15kH Border ABM Bord	PDSCH/PDCCH									
PUCCH/PUSCH subcarrier spacing			kHz							
Subcarrier spacing										
PRACH configuration			kHz							
Initial DL BWP		Comig c			FR1			on 1		
Dedicated DL BWP Initial UL BWP Dedicated UL BWP Dedicated UL BWP EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG DMRS (Note 1) Noc Note2 DLBWP.1.1 DLBWP.0.1 ULBWP.0.1		Initial DL BWP						011 1		
BWP										
Initial UL BWP						DLDV				
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BWP										
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2 dBm/15kH z -98						0				
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2 dBm/15kH z -98	EPRE ratio of PSS to SS									
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N _{oc} Note2 dBm/15kH z -98										
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N _{oc} Note2 dBm/15kH z										
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2 dB 0 dB 0 dB 7 dB 7										
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2 ABm/15kH Z										
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) IN Occ Note2			dB			()			
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2										
EPRE ratio of OCNG to OCNG DMRS (Note 1) N oc Note2 dBm/15kH Z										
1) N oc Note2										
Z -98										
	N Note2			-98						
	Config 1,2					-g	98			

N_{oc} Note2	Config 3	dBm/SCS	-95					
\hat{E}_s/I_{ot}		dB	8	-3.3	-3.3	- Infinity	2.36	2.36
\hat{E}_{s}/N_{oc}		dB	8	8	8	- Infinity	11	11
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	- Infinity	-87	-87
SSB_RP	Config 3	dBm/SCS	-87	-87	-87	- Infinity	-84	-84
IoNote3	Config 1,2	dBm/ 9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06
10.15.50	Config 3	dBm/ 38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96
Propagation condition		-	AWGN A			AWGN		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 220 ms from the beginning of time period T3. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 210 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.2.2.$

This gives a total of 220 ms.

A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.2.2-2, and A.6.3.1.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.2.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.2.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions Active cell			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Inf	ormation	-	Not Sent	No additional delays in random
				access procedure.
PRACH configurat	tion index		FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-
				3 in TS 38.211 [6]
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit	Cel	l 1	Cell 2		
Param	eter	Unit	T1	T2	T1	T2	
NR RF Channel Numbe	•		1			1	
Dupley made	Config 1			F	DD		
Duplex mode	Config 2,3			T	DD		
	Config 1			Not Ap	plicable		
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDC	onf. 2.1		
	Config 1			10: N _R	$_{B,c} = 52$		
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
	Config 1		10: N _{RB,c} = 52				
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
DRx Cycle		ms			plicable		
PDSCH Reference	Config 1				1 FDD		
measurement channel	Config 2				1 TDD		
measurement charmer	Config 3				1 TDD		
CORESET Reference	Config 1				1 FDD		
Channel	Config 2				.1 TDD		
Chamer	Config 3				1 TDD		
	Config 1				.1 FDD		
TRS configuration	Config 2		TRS.1.1 TDD				
	Config 3		TRS.1.2 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration		SMTC pattern 1					

Config 1,2			SSB.	1 FR1		
SSB Configuration Config 3				2 FR1		
PDSCH/PDCCH Config 1,2	1.11-			kHz		
subcarrier spacing Config 3	kHz	30 kHz				
PUCCH/PUSCH Config 1,2	kHz	15 kHz				
subcarrier spacing Config 3	KIIZ			kHz		
PRACH configuration			FR1 PRACH	configuration 1		
Initial DL BWP				/P.0.1		
Dedicated DL BWP		DLBWP.1.1				
BWP configuration Initial UL BWP			ULBV	/P.0.1		
Dedicated UL			ULBV	/P.1.1		
BWP						
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS		0				
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS	dB					
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note						
1)	dDree/4 Eld I					
N_{oc}^{Note2}	dBm/15kH	-98				
Note2 Config 1,2	Z			98		
N Note2 Config 1,2 Config 3	dBm/SCS			95		
\hat{E}_s/I_{ot}	dB	8	-0.64	-Infinity	-0.64	
\hat{E}_{s}/N_{oc}	dB	8	8	-Infinity	8	
Config 1.2	dBm/SCS	-90	-90	-Infinity	-90	
SSB_RP Config 1,2	dBm/SCS	-87	-87	-Infinity	-87	
Config 1,2	dBm/ 9.36MHz	-61.41	-58.71	-61.41	-58.71	
Config 3	dBm/ 38.16MHz	-55.31 -52.60		-55.31	-52.60	
Propagation condition	-	AWGN AWGN			/GN	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 282 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 232$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 282 ms.

A.6.3.1.3 Inter-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 inter frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.3.2-2, and A.6.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.3.2-1: Inter-frequency handover from FR1 to FR1 test configurations

	Config	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.3.1.3.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	-4	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	formation	-	Not Sent	No additional delays in random
_				access procedure.
T1		S	5	
T2		s	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter		Unit	Cell 1		Cell 2		
		Onit	T1	T2	T1	T2	
NR RF Channel Number			1		:	2	
Duploy mode	Config 1			FD	DD		
Duplex mode	Config 2,3			TD	DD		
	Config 1		Not Applicable				
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3		TDDConf.2.1				
	Config 1		10: N _{RB,c} = 52				
BW _{channel}	Config 2	MHz		10: N _{RE}	$_{3,c} = 52$		
	Config 3		40: N _{RB,c} = 106				

		Confin 1	I		40. N	F0		
	Config 1		N 41 1-			B,c = 52		
		Config 2	MHz	10: N _{RB,c} = 52 40: N _{RB,c} = 106				
		Config 3						
TDC		Config 1				.1 FDD		
		Config 2				.1 TDD		
DD:: C::ala	Config 3					.2 TDD		
DRx Cycle		Confin 4	ms			plicable		
PDSCH Re	eference	Config 1				1 FDD		
measurem	ent channel	Config 2				1 TDD		
		Config 3				I TDD		
CORESET	Reference	Config 1			CR.1.			
Channel		Config 2				1 TDD		
OONO D-	1	Config 3				1 TDD		
OCNG Pat						oattern 1		
SMTC Cor	itiguration	0			SMTC p			
SSB Confi	guration	Config 1,2			SSB.			
DD00LI/DI	20011	Config 3				2 FR1		
PDSCH/PI		Config 1,2	kHz			kHz		
subcarrier		Config 3				kHz		
PUCCH/PU		Config 1,2	kHz			kHz		
subcarrier		Config 3		30 kHz				
PRACH CO	nfiguration	Initial DL DWD		FR1 PRACH configuration 1				
		Initial DL BWP Dedicated DL		DLBWP.0.1 DLBWP.1.1				
		BWP		DLDWP.I.I				
BWP		Initial UL BWP			ULBW	/D 0 1		
		Dedicated UL						
		BWP		ULBWP.1.1				
EPRE ratio	of PSS to S	SS						
	of PBCH DN							
		PBCH DMRS						
		MRS to SSS						
		o PDCCH DMRS	dB		()		
		MRS to SSS	ub.		,	,		
	of PDSCH to							
		MRS to SSS(Note 1)						
EPRE ration	of OCNG to	OCNG DMRS (Note						
1)								
N_{oc} Note2			dBm/15kH	- 9	8	-6	98	
	Config 1,2		Z	- g	18	_(98	
N_{oc}^{Note2}	Config 1,2		dBm/SCS	-9			95 95	
\hat{E}_s/I_{ot}	<u> </u>		dB	4	4	-Infinity	5	
\hat{E}_s/N_{oc}		dB	4	4	-Infinity	5		
	Config 1,2		dBm/SCS	-94	-94	-Infinity	-93	
SSB_RP	Config 3		dBm/SCS	-91	-91	-Infinity	-90	
Io ^{Note3}	Config 1,2		dBm/ 9.36MHz	-64.59	-64.59	-70.05	-63.85	
10,40,60	Config 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75	
Propagatio	n condition		-	AW	GN	AW	'GN	
NI-1-4	OCNIC aball l	1 1 1 1 1 1	colle ore fully					

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 282 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 272$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 282 ms.

A.6.3.1.4 SA NR - E-UTRAN handover

A.6.3.1.4.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel N	lumber		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measur	ement quantity		RSRP	
b2-Threshold1		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.6.3.1.4-3	for event B2
b2-Threshold2EU7	ΓRAN	dBm	-98	Absolute E-UTRAN RSRP
				threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Inf	ormation	-	Not sent	No additional delays in random
				access procedure
Time offset between	en cells		3 ms	Asynchronous cells
Gap pattern config	uration Id		0	As specified in Table 9.1.2-1
				started before T2 starts
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

	Parameter	Unit	Configuration		Cell 1	
				T1	T2	T3
RF channel	number		1, 2, 3, 4, 5, 6		1	
Duplex mode	е		1, 4		FDD	
			2, 3, 5, 6		TDD	
TDD Configu	uration		2, 5		TDDConf.1.1	
			3, 6		TDDConf.1.2	
BW _{channel}		MHz	1, 4	10:	$N_{RB,c} = 52 (FC)$	DD)
			2, 5	10:	$N_{RB,c} = 52 (TE)$)D)
			3, 6	40:	$N_{RB,c} = 106 (Tl)$	DD)
PDSCH refe	rence measurement		1, 4		SR.1.1 FDD	
channel			2, 5	SR.1.1 TDD SR.2.1 TDD		
			3, 6			
CORSET ref	ference channel		1, 4	CR.1.1 FDD		
			2, 5	CR.1.1 TDD CR.2.1 TDD		
			3, 6			
TRS configu	ration		1, 4	TRS.1.1 FDD		
			2, 5		TRS.1.1 TDD	
			3, 6		TRS.1.2 TDD	
OCNG patte			1, 2, 3, 4, 5, 6		OP.1	
	Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1	
DWD	Dedicated DL BWP				DLBWP.1.1	
BWP	Initial UL BWP		ULBWP.0.1			
	Dedicated UL BWP				ULBWP.1.1	
SMTC config	guration		1, 2, 3, 4, 5, 6		SMTC.1	

SSB configuration		1, 2, 4, 5		SSB.1 FR1		
		3, 6		SSB.2 FR1		
b2-Threshold1	dBm	1, 2, 4, 5	-96			
	UDIII	3, 6		-93		
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6				
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to						
PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to						
PDCCH_DMRS	dB			0		
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to						
PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG						
DMRS						
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6		-100		
NocNote2	dBm/SCS	1, 2, 4, 5		-100	-100	
		3, 6		-97		
Ês/N _{oc}	dB	1, 2, 3, 4, 5, 6	012	0-4	0-4	
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	012	0-4	0-4	
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104	-104	
		3, 6	-85	-101	-101	
IoNote3	dBm/9.36 MHz	1, 2, 4, 5	-59.78	-70.59	-70.59	
10*****	dBm/38.16 MHz	3, 6	-53.68	-64.49	-64.49	
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	•	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2 Low		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2				
			T1	T2	Т3		
RF channel number		1, 2, 3, 4, 5, 6		2			
Duplex mode		1, 2, 3	FDD				
•		4, 5, 6		TDD			
TDD special subframe configuration Note1		4, 5, 6	6				
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1				
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25			
				10 MHz: $N_{RB,c} = 50$			
				20 MHz: N _{RB,c} = 100			
PRACH		1, 2, 3	4				
Configuration ^{Note2}		4, 5, 6	53				
PDSCH parameters:		1, 2, 3		5 MHz: R.7 FDD			
•				10 MHz: R.3 FDD			

DL Reference				20 MHz: R.6 FDD	
Measurement		4.5.0		F MILE D 4 TDD	
Channel ^{Note3}		4, 5, 6		5 MHz: R.4 TDD	
				10 MHz: R.0 TDD	
POEIGLI/PROGUI/PLUGII		4 0 0		20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FDD	
parameters:				10 MHz: R.6 FDD	
DL Reference				20 MHz: R.10 FDD	
Measurement		4, 5, 6		5 MHz: R.11 TDD	
Channel ^{Note3}				10 MHz: R.6 TDD	
				20 MHz: R.10 TDD	
OCNG Patterns ^{Note3}		1, 2, 3		5 MHz: OP.20 FDD	
				10 MHz: OP.10 FDD)
				20 MHz: OP.17 FDD)
		4, 5, 6		5 MHz: OP.9 TDD	
				10 MHz: OP.1 TDD	
				20 MHz: OP.7 TDD	
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH RA					
PHICH_RB	dB			0	
PDCCH_RA	1			-	
PDCCH RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê _s /N _{oc}	dBiii/13ki12	1, 2, 3, 4, 5, 6	-Infinity	8	78
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	 78	78
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-infinity -Infinity	-90	-90
SCH_RP ^{Note6}	dBm/15kHz				-90 -90
SUIT_KP		1, 2, 3, 4, 5, 6	-Infinity	-90 59.57	-90 -58.57
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21	-58.57	
Dropogotion Condition		1 2 2 4 5 2	+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2 Low	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: \hat{E}_s/I_{ot} , RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 35$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell

A.6.3.1.5.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.5-1. General test parameters are provided in Table A.6.3.1.5-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.5-3 and A.6.3.1.5-4 respectively.

Table A.6.3.1.5-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	s only required to be tested in one of the supported test configurations

Table A.6.3.1.5-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset between cells			3 ms	Asynchronous cells
T1	T1		≤5	
T2		S	1	

Table A.6.3.1.5-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter		Unit Configuration		Ce	Cell 1		
			J	T1	T2		
RF channel num	ber		1, 2, 3, 4, 5, 6		1		
Duplex mode			1, 4	FI	DD		
			2, 3, 5, 6		DD		
TDD Configuration	on		2, 5		onf.1.1		
			3, 6		onf.1.2		
BW _{channel}		MHz	1, 4		= 52 (FDD)		
			2, 5		= 52 (TDD)		
PDSCH reference	no moccurement		3, 6 1, 4		: 106 (TDD) 1 FDD		
channel	e measurement		2, 5		1 TDD		
onamo			3, 6		1 TDD		
CORSET referer	nce channel		1, 4		1 FDD		
00110211010101			2, 5		1 TDD		
			3, 6		1 TDD		
TRS configuration	n		1, 4		.1 FDD		
			2, 5		.1 TDD		
			3, 6	TRS.1	.2 TDD		
OCNG pattern ^{No}			1, 2, 3, 4, 5, 6	0	P.1		
	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1		
	Dedicated DL BWP			DLBV	VP.1.1		
BWP	Initial UL BWP	<u> </u> 			VP.0.1		
	Dedicated UL BWP			ULBV	VP.1.1		
SMTC configura	tion		1, 2, 3, 4, 5, 6	SM	TC.1		
SSB configuration	n		1, 2, 4, 5	SSB.1 FR1			
			3, 6	SSB.2 FR1			
EPRE ratio of PS		<u> </u>	1, 2, 3, 4, 5, 6				
EPRE ratio of PE	BCH_DMRS to						
SSS EPRE ratio of PE	20U to	+					
PBCH_DMRS	SCH IU						
EPRE ratio of PI	OCCH_DMRS to	†					
SSS	300H_BIIII (0 10						
EPRE ratio of PI	OCCH to	†					
PDCCH_DMRS		dB			0		
EPRE ratio of PI	DSCH_DMRS to						
EPRE ratio of PI	DSCH to	1					
PDSCH_DMRS		1					
EPRE ratio of O							
EPRE ratio of O	CNG to OCNG						
DMRS							
N _{oc} Note2		dBm/15 KHz dBm/SCS	1, 2, 3, 4, 5, 6		98		
Noc ^{Note2}	N _{oc} Note2		1, 2, 4, 5 3, 6		98 95		
Ê _s /N _{oc}	Ê _s /N _{oc}		1, 2, 3, 4, 5, 6	0	0		
Ê _s /I _{ot} Note3			1, 2, 3, 4, 5, 6	0	0		
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-98	-98		
			3, 6	-95	-95		
lo ^{Note3}		dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04		
10		dBm/38.16 MHz	3, 6	-60.94	-60.94		

Propagat	ion condition 1, 2, 3, 4, 5, 6 AWGN						
Antenna	Configuration and		1, 2, 3, 4, 5, 6	1x2 Low			
Correlation	on Matrix						
Note 1:	CNG shall be used such that both cells are fully allocated and a constant total transmitted power						
	spectral density is achieved for all OFDM symbols.						
Note 2:	Interference from other ce	lls and noise sou	rces not specified i	in the test is assumed to be constant			
	over subcarriers and time	and shall be mod	delled as AWGN of	appropriate power for N_{oc} to be			
	fulfilled.						
Note 3:	Ê _s /l _{ot} , SS-RSRP, and lo levels have been derived from other parameters for information purposes.						
	They are not settable parameters themselves.						

Table A.6.3.1.5-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	С	ell 2
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6		2
Duplex mode		1, 2, 3	F	DD
		4, 5, 6	٦	TDD
TDD special subframe configuration ^{Note1}		4, 5, 6		6
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1
BWchannel	MHz	1, 2, 3, 4, 5, 6	10 MHz	N _{RB,c} = 25 : N _{RB,c} = 50 N _{RB,c} = 100
PRACH Configuration ^{Note2}		1, 2, 3		4
		4, 5, 6		53
PDSCH parameters: DL Reference Measurement Channel ^{Note3}		1, 2, 3	10 MHz	: R.7 FDD :: R.3 FDD :: R.6 FDD
		4, 5, 6	5 MHz 10 MHz	: R.4 TDD z: R.0 TDD z: R.3 TDD
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement		1, 2, 3	10 MHz	R.11 FDD z: R.6 FDD : R.10 FDD
Channel ^{Note3}		4, 5, 6	10 MHz	R.11 TDD z: R.6 TDD : R.10 TDD
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: (10 MHz:	OP.20 FDD OP.10 FDD OP.17 FDD
		4, 5, 6	5 MHz: 10 MHz:	OP.9 TDD OP.1 TDD OP.7 TDD
PBCH_RA PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RB PDCCH_RA PDCCH_RB	dB	1, 2, 3, 4, 5, 6		0
PDSCH_RA PDSCH_RB OCNG_RANote4 OCNG_RBNote4				

N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity 7	
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6	1x2 Low	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: \hat{E}_s/I_{ot} , RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 115$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.6.3.2 RRC Connection Mobility Control

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

Configuration Description					
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	ote: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offset	between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer; T310 is disabled
T311	T311		1, 2, 3	3000	RRC re-establishment timer
Access Bar	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
DDV avala	DDV 1 1 d		4.0.0	pattern 1	
DRX cycle		S	1, 2, 3 1, 2, 3	OFF 402	The detailed configuration is an acidical in
	nfiguration index			102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			N/A	
		2		DDConf.1.		TDDConf.1.1		
		3		DDConf.2.		Т	DDConf.2.	.1
PDSCH RMC		1		SR.1.1 FDD			N/A	
configuration		2		SR.1.1 TDD				
		3		SR.2.1 TDD				
RMSI CORESET		1		CR.1.1 FDE			CR.1.1 FDI	
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDI)
		3		CR.2.1 TDD			CR.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FD			CR.1.1 FD	
RMC configuration		2		CR.1.1 TD			CR.1.1 TD	
		3		CR.2.1 TD			CR.2.1 TD	
OCNG Pattern		1, 2, 3	OP.1 c	defined in A	.3.2.1	OP.1 c	defined in A	٩.3.2.1
TRS configuration		1		RS.1.1 FDI			N/A	
		2	Т	RS.1.1 TDI)			
		3		RS.1.2 TDI				
Initial DL BWP		1, 2, 3		DLBWP.0.1		[DLBWP.0.	1
configuration								
Initial UL BWP		1, 2, 3	ULBWP.0.1		ULBWP.0.1			
configuration								
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB			SSB	1
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$	dB	1	1.54	-infinity	-infinity	-3.79	4	4
		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
1 oc		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
1 voc		2						
		3					,	
\hat{E}_{s}/N_{oc}	dB	1	7	-infinity	-infinity	4	4	4
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94
		2	-91	-infinity	-infinity	-94	-94	-94
		3	-88	-infinity	-infinity	-91	-91	-91
lo	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/9.36 MHz	2	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/38.16 MHz	3	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation Condition		1, 2, 3			AWG	iN		

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers Note 2:

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

A.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

1

 $T_{identify_intra_NR} = 200 \ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD			
	duplex mode	duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode	duplex mode			
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1, 2	
Time offset	between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer; T310 is disabled
T311	T311		1, 2, 3	5000	RRC re-establishment timer
Access Bar	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
DDV avele	DDV social legistr		4.0.0	pattern 1	
DRX cycle		S	1, 2, 3 1, 2, 3	OFF 402	The detailed configuration is an acidical in
	nfiguration index			102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	5	

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter Unit		Test		Cell 1		Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
RF Channel Number		1, 2, 3		1			2	
TDD configuration		1		N/A		N/A		
		2	_	TDDConf.1.		T	DDConf.1.	1
		3	_	TDDConf.2.		TDDConf.2.1		
PDSCH RMC		1		SR.1.1 FDD		N/A		
configuration		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
RMSI CORESET		1	CR.1.1 FDD CR.1.1 FI		CR.1.1 FDE)		
RMC configuration		2		CR.1.1 TDD		CR.1.1 TDD		
		3		CR.2.1 TDD		CR.2.1 TDD		
Dedicated CORESET		1	(CCR.1.1 FDD CCR.1.1		CR.1.1 FD	D	
RMC configuration		2	CCR.1.1 TDD			CCR.1.1 TDD		
-		3	CCR.2.1 TDD		CCR.2.1 TDD		D	
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1 OP.1 defined in A.3.				١.3.2.1	
TRS configuration		1	TRS.1.1 FDD N/A					

		2	Т	RS.1.1 TDI)				
		3	TRS.1.2 TDD						
Initial DL BWP		1, 2, 3		DLBWP.0		DLBWP.0			
configuration									
Initial UL BWP		1, 2, 3		ULBWP.0			ULBWP.0		
configuration								1	
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW	
confgiuration			1.1					P.1.1	
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW	
configuration			1.1					P.1.1	
RLM-RS		1, 2, 3		SSB			SSB		
\hat{E}_{s}/I_{ot}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7	
		2							
		3							
N_{oc} Note2	dBm/SCS	1	-98						
1 voc		2	-98						
		3			-95				
N_{oc} Note2	dBm/15 kHz	1			-98				
1 Voc Notes		2							
		3							
\hat{E}_{s}/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7	
3 7 00		2							
		3							
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91	
		2	-94	-infinity	-infinity	-infinity	-infinity	-91	
		3	-91	-infinity	-infinity	-infinity	-infinity	-88	
lo	dBm/9.36 MHz	1	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26	
	dBm/9.36 MHz	2	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26	
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15	
Propagation Condition		1, 2, 3	AWGN						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; ms + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify_intra_NR} = 800 \text{ ms}$

 $T_{identify inter NR} = 800 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

Co	onfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

	Parameter		Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311	T311		1, 2, 3	3000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
				pattern 1	
DRX cycle		S	1, 2, 3 1, 2, 3	OFF	
	onfiguration index			102	The detailed configuration is specified in clause 6.3.3.2 of TS 38.211 [6]
T1		S	1, 2, 3	5	
T2		S	1, 2, 3	6	Time for the UE to detect RLF
T3		S	1, 2, 3	3	

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A	•		N/A	
_		2	Т	DDConf.1.	1	TDDConf.1.1		
		3	TDDConf.2.1			TDDConf.2.1		
PDSCH RMC		1	SR.1.1 FDD				N/A	
configuration		2	S	R.1.1 TDD)			
		3	S	R.2.1 TDD)			
RMSI CORESET		1	C	R.1.1 FDD)	(CR.1.1 FDI)
RMC configuration		2	C	R.1.1 TDD)	(CR.1.1 TDI)
· ·		3		R.2.1 TDD			CR.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
· ·		3		CR.2.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.	
configuration		, ,						
Initial UL BWP		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
configuration								
RLM-RS		1, 2, 3		SSB		SSB		
\hat{E}_{s}/I_{ot}	dB	1	4	-infinity	-infinity	-infinity	-infinity	4
— s / - ot		2					-	
		3						
M Neuro	dBm/SCS	1			-98		•	•
N_{oc} Note2		2			-98			
		3			-95			
M Notes	dBm/15 kHz	1			-98			
N_{oc} Note2		2						
		3						
\hat{E}_{s}/N_{qc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	4
2 s / 1, oc		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-94
		2	-94	-infinity	-infinity	-infinity	-infinity	-94
		3	-91	-infinity	-infinity	-infinity	-infinity	-91
lo	dBm/9.36 MHz	1	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-58.50
Propagation	,	1, 2, 3			AWG			
Condition	1	, , -						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_delay} = T_{UL_grant} + T_{UE_re-establish_delay}$$
.

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used

$$T_{UE_re-establish_delay} = 50 \; \text{ms} \; + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 800 \ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

A.6.3.2.2 Random Access

A.6.3.2.2.1 Contention based random access test in FR1 for NR standalone

A.6.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.1.1-1. UE capble of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.1.1-2.

Table A.6.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone

Co	onfig	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	he UE is only reapability	equired to be tested in one of the supported test configurations depending on UE

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter		Unit	Test-1	Comments	
SSB Configur	ation	Config 1		SSB pattern 1 in FR1	As defined in A.3.10,
		Config 2		SSB pattern 2 in FR1	except for number of
					SSBs per SS-burst and
					SS/PBCH block index as
N	D 00				below
Number of SS	Bs per SS	i-burst		2	Different from the definition in A.3.10
SS/PBCH block	sk indev			0,1	Different from the
33/F BCIT blo	SK IIIUGX			0,1	definition in A.3.10
Duplex Mode	for Cell 2	Config 1		FDD	definition in 7 t.c. 10
2 4 10 11 11 11 11 11		Config 2		TDD	1
TDD Configur	ation	Config 2		TDDConf.1.2	
OCNG Patteri	1 Note 1	<u>, </u>		OCNG pattern 1	As defined in A.3.2.1.
PDSCH parar	neters	Config 1		SR.1.1 FDD	As defined in A.3.1.1.
Note 4		Config 2		SR.2.1 TDD	
NR RF Chann	el Numbe	r		1	
EPRE ratio of	PSS to S	SS	dB		
EPRE ratio of			dB		
		PBCH_DMRS	dB		
		DMRS to SSS	dB	0	
		PDCCH_DMRS	dB		
EPRE ratio of			dB		
EPRE ratio of		PDSCH_DMRS	dB		
00Dith	\hat{E}_s/I_{ot}		dB	3	Power of SSB with index
SSB with index 0	N_{oc}	Config 1	dBm/15kHz	-98	0 is set to be above configured rsrp-
maox o	1 oc	Config 2		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSR	P Note 3	dBm/ SCS	-95]
	\hat{E}_s/I_{ot}		dB	-17	Power of SSB with index
SSB with index 1	N_{oc}	Config 1	dBm/15kHz	-98	1 is set to be below configured rsrp-
maox i	1 oc	Config 2		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	1
lo Note 2		Config 1	dBm	-65.3/9.36MHz	For symbols without SSB
10 11010 2		Config 2		-62.2/38.16MHz	index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured Ul	E transmitt	ed power (dBm	23	As defined in clause
$P_{\text{CMAX}, f, c}$)				6.2.4 in TS 38.101-1.	
PRACH Confi	guration			FR1 PRACH configuration 1	As defined in A.3.x.

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.4.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.6.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall not send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capble of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.6.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations depending on UE

Table A.6.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

	Parame	ter	Unit	Test-1	Test-2	Comments	
SSB Configuration		Config 1		SSB pattern 1 in FR1	SSB pattern 1 in FR1	As defined in A.3.10, except for	
		Config 2		SSB pattern 2 in FR1	SSB pattern 2 in FR1	number of SSBs per SS-burst and	
						SS/PBCH block index as below	
Number of S	SBs per SS	-burst		2	2	Different from the definition in A.3.10	
SS/PBCH blo	ock index			0,1	0,1	Different from the definition in A.3.10	
CSI-RS Conf	iguration	Config 1 Config 2		N/A	CSI-RS.1.1 FDD CSI-RS.2.1 TDD	As defined in A.3.1.4	
Duplex Mode	Duplex Mode for Cell 2 Config 1			FDD TDD	FDD TDD	7.5.1.4	
TDD Configu	Config 2 FDD Configuration Config 2			TDDConf.1.2	TDDConf.1.2		
OCNG Patte	rn ^{Note 1}	Coning 2		OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.	
PDSCH para	meters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in	
Note 4		Config 2	-	SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.	
NR RF Channel Number		1		1	1		
EPRE ratio o			dB				
	EPRE ratio of PBCH_DMRS to SSS		dB				
	EPRE ratio of PBCH to PBCH_DMRS		dB				
		DMRS to SSS	dB	0	0		
		PDCCH_DMRS	dB				
		DMRS to SSS DPDSCH_DMRS	dB dB				
EPRE IAIIO O	\hat{E}_s/I_{ot}	PDSCH_DIVIKS	dB	3	3	Power of SSB with	
SSB with		Config 1	dBm/15kHz	-98	-98	index 0 is set to be	
index 0	N_{oc}	Config 2		-101	-101	above configured rsrp-ThresholdSSB	
	\hat{E}_s/N_{oc}		dB	3	3		
	SS-RSR	D Note 3	dBm/ SCS	-95	-95	-	
	\hat{E}_s/I_{ot}	Г	dBiil/ 3C3	-17	-17	Power of SSB with	
SSB with index 1		Config 1	dBm/15kHz	-98	-98	index 1 is set to be	
index i	N_{oc}	Config 2	-	-101	-101	below configured rsrp-ThresholdSSB	
	\hat{E}_s/N_{oc}		dB	-17	-17		
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	-	
. Nete 2	•	Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without	
lo Note 2		Config 2		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1	
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].		
Configured UE transmitted power ($P_{\mathrm{CMAXf.c}}$)		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-		
PRACH Con	figuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.	
Propagation	Condition		-	AWGN	AWGN		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -30 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.3 SA: RRC Connection Release with Redirection

A.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.1.2-1: Redirection from NR to NR test configurations

	Config	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is onl	y required to be tested in one of the supported test configurations

Table A.6.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Pa	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring In	Access Barring Information		Not Sent	No additional delays in random access procedure.
Time offset between cells			3 µs	Synchronous cells
T1		S	5	
T2		s	2.3	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter		Unit	Cell 1		Cell 2		
		Unit	T1	T2	T1	T2	
NR RF Channel Numbe			1		2		
Duplex mode	Config 1			FDD TDD			
	Config 2,3						
	Config 1			Not App			
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDC	onf.2.1		
	Config 1			10: N _{RE}	3,c = 52		
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
	Config 1		10: N _{RB,c} = 52				
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: $N_{RB,c} = 106$				
DRx Cycle		ms	Not Applicable				
	Config 1		SR.1.1 FDD				
PDSCH Reference measurement channel	Config 2	SR.1.1 TDD		I TDD			
	Config 3		SR2.1 TDD				
CORESET Reference	Config 1		CR.1.1 FDD				
Channel	Config 2			CR.1.1		1 TDD	

	Config 3			CR2	1 TDD		
	Corning 3			OINZ.	יטטו ו		
OCNG Patterns			OCNG pattern 1				
OMTO C. C.	Config 1,2		SMTC.1 FR1				
SMTC configuration	Config 3	i		SMTC.2 FR1			
PDSCH/PDCCH	Config 1,2	Id In	15 kHz				
subcarrier spacing		- kHz		30	kHz		
PUCCH/PUSCH	Config 1,2	kHz		15	kHz		
subcarrier spacing	Config 3	KITZ			kHz		
PRACH configurat	tion			FR1 PRACH	configuration 1		
BWP configuration	n Initial DL BWP			DLBV	VP.0.1		
	Dedicated DL BWP			DLBV	VP.1.1		
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.1				
EPRE ratio of PDO EPRE ratio of PDO EPRE ratio of PDS EPRE ratio of PDS EPRE ratio of OCI	S to SSS CH DMRS to SSS CH to PBCH DMRS CCH DMRS to SSS CCH to PDCCH DMRS SCH DMRS to SSS	dB	0				
N Note2		dBm/15kH	-98				
	112	Z	-98				
N oc Note2 Config		dBm/SCS			95 95		
$\hat{E}_{s}/I_{ m ot}$		dB	4	4	-infinity	4	
\hat{E}_s/N_{oc}		dB	4	4	-infinity	4	
Io ^{Note3} Config	ງ 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59	
Config	3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49	
Propagation condi		-	-11111	AW	AWGN		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH},$$

where:

T_{RRC_procedure_delay} = 110 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = 680 \text{ ms in the test.}$

 $T_{\text{SI-NR}} = 1280$ ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 170 \text{ ms in the test.}$

This gives a total of 2240 ms.

A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD				
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD				
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD				
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD				
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD				
Note: The UE is	Note: The UE is only required to be tested in one of the supported test configurations				

Table A.6.3.2.3.2.2-2: General test parameters for Redirection from NR to E-UTRAN test case

Pa	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	2.3	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Poromotor	Unit	Cell 1		
Parameter		T1	T2	
RF Channel Number		1		

Duplex mode	Config 1		FDD
= apiox mode	Config 2,3		TDD
TDD configuration	Config 1	. -	Not Applicable
	Config 2	.	TDDConf.1.1
	Config 3		TDDConf.2.1
BWchannel	Config 1	MHz MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
	Config 1		10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: $N_{RB,c} = 106$
DRx Cycle		ms	Not Applicable
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD
	Config 2		SR.1.1 TDD
	Config 3		SR2.1 TDD
CORESET Reference Channel	Config 1		CR.1.1 FDD
	Config 2		CR.1.1 TDD
	Config 3		CR2.1 TDD
OCNG Patterns			OCNG pattern 1
SMTC configuration PDSCH/PDCCH subcarrier spacing PUCCH/PUSCH	Config 1,2		SMTC.1 FR1
	Config 3		SMTC.2 FR1
	Config 1,2	kHz -	15 kHz
	Config 3		30 kHz
	Config 1,2		15 kHz
subcarrier spacing	Config 3	kHz -	30 kHz
PRACH configuration			FR1 PRACH configuration 1
BWP configuraiton	Initial DL BWP		DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0
Note2		dBm/15kH z	-98

N oc Note2	Config 1,2	dBm/SCS	-9	98
oc oc	Config 3		-Ç	95
\hat{E}_{s}/I_{ot}		dB	4	4
\hat{E}_s/N_{oc}		dB	4	4
Io ^{Note3}	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59
10.10.00	Config 3	dBm/ 38.16MHz	-58.49	-58.49
Propagation condition		-	AW	GN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.2.3.2.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

Parameter	Unit	Configuration	C	ell 2
		-	T1	T2
RF channel number		1, 2, 3, 4, 5, 6		2
Duplex mode		1, 2, 3	F	DD
		4, 5, 6	Т	DD
TDD special subframe configuration ^{Note1}		4, 5, 6		6
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz:	N _{RB,c} = 25
			10 MHz:	$N_{RB,c} = 50$
			20 MHz:	$N_{RB,c} = 100$
PRACH Configuration ^{Note2}		1, 2, 3		4
		4, 5, 6		53
PDSCH parameters:		1, 2, 3	5 MHz:	R.7 FDD
DL Reference Measurement			10 MHz	: R.3 FDD
Channel ^{Note3}			20 MHz	:: R.6 FDD
		4, 5, 6	5 MHz:	R.4 TDD
			-	:: R.0 TDD
				:: R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3		R.11 FDD
parameters:				: R.6 FDD
DL Reference Measurement				R.10 FDD
Channel ^{Note3}		4, 5, 6		R.11 TDD
			-	:: R.6 TDD
N. a				R.10 TDD
OCNG Patterns ^{Note3}		1, 2, 3		OP.20 FDD
				OP.10 FDD
				OP.17 FDD
		4, 5, 6		OP.9 TDD
				OP.1 TDD
			20 MHz:	OP.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6		
PBCH_RB				
PSS_RA	dB			0
SSS_RA				
PCFICH_RB				
PHICH_RA				

DUIGU DD				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA ^{Note4}				
OCNG_RB ^{Note4}	1			
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-9	8
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	4
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76
Propagation Condition		1, 2, 3, 4, 5, 6	AW	CN

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

 $T_{connection_release_redirect_E-UTRA} = T_{RRC_procedure_delay} + T_{identify-E-UTRA} + T_{SI-E-UTRA} + T_{RACH},$

where:

 $T_{RRC_procedure_delay} = 110 \text{ ms}$ and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-E-UTRA} = 800 \text{ ms in the test.}$

 $T_{\text{SI-E-UTRA}} = 1280 \text{ ms}$, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

 $T_{RACH} = 15$ ms in the test.

This gives a total of 2205 ms.

A.6.4 Timing

A.6.4.1 UE transmit timing

A.6.4.1.1 NR UE Transmit Timing Test for FR1

A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 6.4.1.1.1-1

Table A.6.4.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE configur	is only required to be tested in one of the supported test ations

For this test a single NR cell is used. Table A.6.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.6.4.1.1.1-3.

Table A.6.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1,2,3	1	1
TDD (" ("		1	Not Ap	plicable
TDD configuration		2	TDDConf.1.1	
		3	TDDConf.1.2	
		1	10: N _R	_{B,c} = 52
BWchannel	MHz	2		$_{\rm B,c} = 52$
		3		s,c = 106
Initial BWP Configuration		1,2,3		/P.0.1 /P.0.1
Dedicated BWP Configuration		1,2,3		/P.1.1 /P.1.1
DRx Cycle	ms	1,2,3	N/A	DRX.5 ^{Note5}
PDSCH Reference		1	SR.1.	1 FDD
measurement channel		2	SR.1.	1 TDD
		3	SR.2.	1 TDD
RMSI CORESET		1	CR.1.	1 FDD
Reference Channel		2	CR.1.1 TDD	
		3	CR.2.	1 TDD
Dedicated CORESET		1	CCR.1	.1 FDD
Reference Channel		2	CCR.1.1 TDD	
		3		.1 TDD
OCNG Patterns		1,2,3	OP.1	
SSB configuration		1,2		1 FR1
0		3		2 FR1
SMTC Configuration		1		ГС.1
3		3		ГС.2
		1	TRS.1	.1 FDD
TRS configuration		2	TRS.1	.1 TDD
		3	TRS.1	.2 TDD
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS	dB	1,2,3	0	0
EPRE ratio of PBCH to PBCH DMRS				

			-	-
EPRE ratio of PDCCH				
DMRS to SSS				
EPRE ratio of PDCCH to	Ī			
PDCCH DMRS				
EPRE ratio of PDSCH	Ī			
DMRS to SSS				
EPRE ratio of PDSCH to	Ī			
PDSCH				
EPRE ratio of OCNG				
DMRS to SSS(Note 1)				
EPRE ratio of OCNG to				
OCNG DMRS (Note 1)				
N Note2	dBm/15 kHz	1,2,3	-98	-98
N Note2	JD/CCC	1,2	-98	-98
00	dBm/SCS	3	-95	-95
\hat{E}_s/I_{ot}		1,2,3	3	3
\hat{E}_s/N_{oc}		1,2,3	3	3
SS-RSRP ^{Note3}	dD/000	1,2	-95	-95
	dBm/SCS	3	-92	-92
Io ^{Note3}	dBm/9.36MHz	1,2	-65.2	-65.2
	dBm/38.1MHz	3	-59.2	-59.2
Propagation condition		1,2,3	AW	
SRS Config		1,2	SRSConf.1 ^{Note6}	SRSConf.3 ^{Note6}
		3	SRSConf.1 ^{Note6}	SRSConf.2Note6

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: DRx related parameters are given in Table A.3.3.5-1
- Note 6: SRS configs are given in Table A.6.4.1.1.1-3

number

SRSConf.1 SRSConf.2 SRSConf.3 Comments SRSsrs-ResourceSetId 0 0 0 ResourceSet srs-ResourceIdList 0 0 0 Periodic Periodic Periodic resourceType Codebook Codebook Codebook Usage SRS-SRS-Resourceld 0 0 0 Resource nrofSRS-Ports Port1 Port1 Port1 $transmission \\ Comb$ n2 n2 n2 combOffset-n2 0 0 0 cyclicShift-n2 0 0 0 0 0 resourceMapping 0 startPosition resourceMapping n1 n1 n1 nrofSymbols resourceMapping n1 n1 n1 repetitionFactor freqDomainPosition 0 0 0 freqDomainShift 0 0 0 Matches freqHopping 14 for test 25 14 c-SRS configuration 1,2 $N_{RB,c}$ 25 for test configuration 3 freqHopping 0 0 0 b-SRS freqHopping 0 0 0 b-hop groupOrSequenceHopping Neither Neither Neither resourceType Periodic Periodic Periodic periodicityAndOffset-p sl1, 0 sl640, 5 sl320, 3 Offset to align with DŘx periodicity 0 0 0 sequenceld Any 10 bit

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

Table A.6.4.1.1.1-4: Void

A.6.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Setup NR PCell according to parameters given in Table A.6.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

 SCS of SSB signals (KHz)
 Adjustment Value

 Test1
 Test2

 15
 +64*64Tc
 +32*64Tc

 30
 +32*64Tc
 +16*64Tc

Table A.6.4.1.1.2-1: Adjustment Value for DL Timing

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.6.4.2 UE timer accuracy

A.6.4.3 Timing advance

A.6.4.3.1 SA FR1 timing advance adjustment accuracy

A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.6.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	ne UE is only required to be tested in one of the supported test configurations			

Table A.6.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new} = N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192*T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Por	ameter	Unit	Test1		
Fai	ameter	Onit	T1	T2	
Dunlay mada	Config 1		FDD		
Duplex mode	Config 2,3		TDD		
	Config 1		Not App	olicable	
TDD configuration	Config 2		TDDC	onf.1.1	
	Config 3		TDDC	onf.2.1	
	Config 1		10: N _{RE}	3,c = 52	
BWchannel	Config 2	MHz	10: N _{RE}	$a_{c} = 52$	
	Config 3		40: N _{RB}	,c = 106	
	Config 1		10: N _{RB,c} = 52		
BWP BW	Config 2	MHz	10: N _{RB,c} = 52		
	Config 3		$40: N_{RB,c} = 106$		
DRx Cycle			Not Applicable		
PDSCH Reference	Config 1		SR.1.2		
measurement	Config 2		SR.1.1	1 TDD	
channel	Config 3		SR2.1	TDD	
CORESET	Config 1		CR.1.	1 FDD	
Reference Channel	Config 2		CR.1.	1 TDD	
Reference Chamilei	Config 3		CR2.1	TDD	
	Config 1,4		TRS.1.	1 FDD	
TRS configuration	Config 2,5		TRS.1.1 TDD		
	Config 3,6		TRS.1.	2 TDD	
OCNG Patterns			OCNG p	pattern 1	
SMTC	Config 1,2		SMTC	.1 FR1	
configuration	Config 3		SMTC	.2 FR1	
	Config 1,2	kHz	15 l	·Hz	

PDSCH/PDCCH Config 3		
		30 kHz
subcarrier spacing		45 HU-
PUCCH/PUSCH Config 1,2	kHz	15 kHz
subcarrier spacing Config 3		30 kHz
EPRE ratio of PSS to SSS		
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS	-ID	
EPRE ratio of PDSCH DMRS to SSS	dB	0
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note	1	
1)		
N oc Note2	dBm/15kH	-98
IV oc	Z	-96
Note2 Config 1,2	-ID/CCC	-98
N oc Note2 Config 1,2 Config 3	dBm/SCS	-95
\hat{E}_s/I_{ot}	dB	3
\hat{E}_s/N_{oc}	dB	3
Config 1,2	dBm/	-67.57
Io ^{Note3}	9.36MHz	01101
Config 3	dBm/	-62.58
	38.16MHz	
Propagation condition	-	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Fid	eld	Value	Comment
c-SRS	Config 1,2	12	
C-5K5	Config 3	24	Fraguency hopping is disabled
b-S	RS	0	Frequency hopping is disabled
b-ł	пор	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDon	nainShift	0	
groupOrSequ	enceHopping	neither	No group or sequence hopping
SRS-Periodi	cityAndOffset	sl5=0	Once every 5 slots
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation
usa	age	Codebook	Codebook based UL transmission
startP	osition	0	resourceMapping setting. SRS on last
nrofSy	mbols	n1	symbol of slot, and 1symbols for SRS
repetition	nFactor	n1	without repetition.
combOffset-n2		0	transmission Comb cotting
cyclicShift-n2		0	transmissionComb setting
nrofSRS-Ports		port1	Number of antenna ports used for SRS transmission
Note: For further	er information see clau	use 6.3.2 in TS 38	.331 [2].

A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.6.5 Signalling characteristics

A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

Configuration		Description		
1		FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2		TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3		TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
		is only required to pass in one of the supported test ations in FR1		

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter			Unit	Value
	. aranic		J	Test 1
Active PCel				Cell 1
RF Channe				1
Duplex mod	le	Config 1		FDD
		Config 2, 3		TDD
BW _{channel}		Config 1	MHz	10: N _{RB,c} = 52
		Config 2	-	10: N _{RB,c} = 52
DI initial D	M/D	Config 3		40: N _{RB,c} = 106
DL initial BV configuratio		Config 1, 2, 3		DLBWP.0.1
DL dedicate	ad BWP	Config 1, 2, 3		
configuratio		001111g 1, 2, 0		DLBWP.1.1
UL initial BV		Config 1, 2, 3		LII DIMB o 4
configuratio		, , , , ,		ULBWP.0.1
UL dedicate		Config 1, 2, 3		LII DWD 4.4
configuratio	n			ULBWP.1.1
TDD Config	uration	Config 1		Not Applicable
		Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
CORESET		Config 1		CR.1.1 FDD
Reference (Channel	Config 2		CR.1.1 TDD
		Config 3		CR.2.1 TDD
SSB Config	uration	Config 1		SSB.1 FR1
		Config 2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Conf	riguration	Config 1, 2		SMTC.1
		Config 3		SMTC.1
PDSCH/PD		Config 1, 2	ig 1, 2	
subcarrier s	pacing	Config 3		30 kHz
PRACH		Config 1, 2		Table A.3.8.2.1-1
Configuration	on	Config 3		Table A.3.8.2.1-1
SSB index a	assigned a	s RLM RS		0
OCNG para				OP.1
CP length				Normal
Correlation		l Antenna		2x2 Low
Configuration				
Out of	DCI form			1-0
sync	Number	of Control OFDM		2
transmissi			005	
on parameter	Aggregat		CCE	8
S		nypothetical RE energy to	dB	4
		SSS RE energy		
		nypothetical	dB	4
		DMRS energy to	U.D	-
		SSS RE energy		
DMRS p				REG bundle size
granularity REC bund				6
DRX REG bundle size		1	0FF	
Gap pattern	ıID			gp0
Layer 3 filte				Enabled
T310 timer			ms	0
T311 timer			ms	1000

N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for CSI	Config 2		CSI-RS.1.1 TDD
reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Par	Unit		Test 1		
			T1	T2	T3
EPRE ratio of PDC	CH DMRS to SSS	dB		4	
EPRE ratio of PDC	dB		0		
EPRE ratio of PBC	H DMRS to SSS	dB			
EPRE ratio of PBC	H to PBCH DMRS	dB			
EPRE ratio of PSS	to SSS	dB			
EPRE ratio of PDS	CH DMRS to SSS	dB		0	
EPRE ratio of PDS	CH to PDSCH DMRS	dB			
EPRE ratio of OCN	NG DMRS to SSS	dB			
EPRE ratio of OCN	NG to OCNG DMRS	dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
SNR on other channels and signals	Config 1, 2, 3	dB	1		
M	Config 1	dBm/		-98	
N _{oc} Config 2		15kH		-98	
	Config 3	Z		-98	
M	Config 1	dBm/		-98	
N_{oc}	Config 2	SCS		-98	
	Config 3			-95	
Propagation condit	tion		TDL	-C 300ns 1	00Hz

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 are

The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.1.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 1
		Value
gapOffset		0
Note: Ensure the measuren		at RLM RS is partially overlapped with nent gap

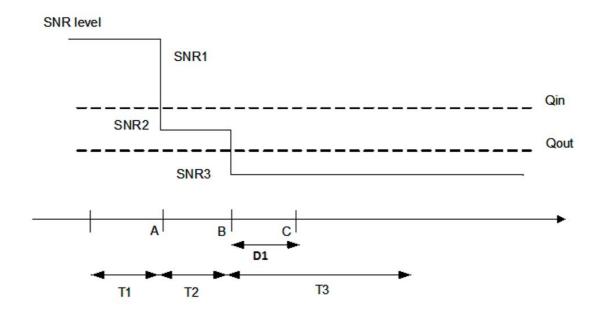


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.2.1-1.

The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configuration		Description				
1		FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz				
2		TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz				
3		TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz				
Note:		is only required to pass in one of the supported test ations in FR1				

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parar	neter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number	•		1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: $N_{RB,c} = 52$
	Config 2		10: $N_{RB,c} = 52$
	Config 3		40: $N_{RB,c} = 106$
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC	Config 1, 2		SMTC.1
Configuration	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	Config 3		Table A.3.8.2.1-1
SSB index assigned	as RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix an	nd Antenna		2x2 Low
Configuration			

In sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical PDCCH DMRS	dB	0
	energy to average SSS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		me	1000
T311 timer		ms ms	1000
N310		1113	1
N311			<u>'</u> 1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.1.1 TDD
CSI-RS for	Config 1, 4		
tracking	Config 2 F		TRS.1.1 FDD TRS.1.1 TDD
liacking	Config 2, 5		TRS.1.1 TDD
T1	Config 3, 6		0.2
T2		S	0.2
T3		S	0.24
T4		S	0.24
T5		S	
D1		S	0.88 0.84
	figurations are assigned	S to the LIE	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Para	Unit			Test 1			
			T1	T2	T3	T4	T5
EPRE ratio of PDC	dB			4			
EPRE ratio of PDC	CH to PDCCH DMRS	dB			0		
EPRE ratio of PBCI	H DMRS to SSS	dB					
EPRE ratio of PBCI	H to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB					
EPRE ratio of PDS	CH DMRS to SSS	dB			0		
EPRE ratio of PDS	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	G DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
SNR on other channels and signals	Config 1, 2, 3	dB	1				
N	Config 1	dBm/		-98			
N_{oc}	Config 2	15		-98			
Config 3		kHz	-98				
N	Config 1	dBm/			-98		
N_{oc}	Config 2	SCS			-98		
Config 3					-95		
Propagation conditi	on			TDL-C	300ns	100Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

SNR level SNR₁ SNR5 SNR2 SNR4 Qout SNR3 Α В C D F E D1 T1 T3 T4 T5 T2

Table A.6.5.1.2.1-4: Void

Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
	is only required to pass in one of the supported test rations in FR1

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Numl			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2	<u> </u>	10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3		DLBWP.0.1
configuration			
DL dedicated	Config 1, 2, 3		DI DIMO 4.4
BWP			DLBWP.1.1
configuration UL initial BWP	Carfin 4 0 0		
	Config 1, 2, 3		ULBWP.0.1
configuration	Carfin 4 0 0		
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
configuration			ULBWP.1.1
TDD	Config 1		Not Applicable
Configuration	Config 2		TDDConf.1.1
Comigaration	Config 3		TDDConf.2.1
CORESET	Config 1		CR.1.1 FDD
Reference	Config 2		CR.1.1 TDD
Channel	Config 3		CR.2.1 TDD
SSB	Config 1		SSB.1 FR1
Configuration	Config 2		SSB.1 FR1
o o garano	Config 3		SSB.2 FR1
SMTC	Config 1, 2		SMTC.1
Configuration	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier	•		
spacing	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	Config 3		Table A.3.8.2.1-1
SSB index assign	_		0
OCNG parameter			OP.1
CP length			Normal
Correlation Matrix	and Antenna		2x2 Low
Configuration			-
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		_
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average	dB	4		
-	SSS RE energy Ratio of	dB	4		
	hypothetical PDCCH DMRS energy to average	αв	4		
	SSS RE energy				
	DMRS precoder granularity		REG bundle size		
	REG bundle size		6		
DRX Configuratio	DRX Configuration		DRX.3		
Gap pattern ID			N.A.		
Layer 3 filtering			Enabled		
T310 timer		ms	0		
T311 timer		ms	1000		
N310			1		
N311			1		
CSI-RS	Config 1		CSI-RS.1.1 FDD		
configuration for	Config 2		CSI-RS.1.1 TDD		
CSI reporting	Config 3		CSI-RS.2.1 TDD		
CSI-RS for	Config 1		TRS.1.1 FDD		
tracking	Config 2		TRS.1.1 TDD		
	Config 3		TRS.1.2 TDD		
T1	·	S	0.2		
T2		S	0.68		
T3		S	0.68		
D1		S	0.64		

Note 1: All configurations are assigned to the UE prior to the start of time period

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Pa	Unit		Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS		dB		4	
EPRE ratio of PDC0	CH to PDCCH DMRS	dB		0	
EPRE ratio of PBCl	H DMRS to SSS	dB			
EPRE ratio of PBCh	H to PBCH DMRS	dB			
EPRE ratio of PSS	to SSS	dB		0	
EPRE ratio of PDS0	CH DMRS to SSS	dB			
EPRE ratio of PDS0	CH to PDSCH DMRS	dB			
EPRE ratio of OCN	G DMRS to SSS	dB			
EPRE ratio of OCN	G to OCNG DMRS	dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3	T	1	-7	-15
SNR on other					
channels and	Config 1, 2, 3	dB	1		
signals					
N_{oc}	Config 1	dBm/15		-98	
¹ δι	Config 2	kHz	-98		
	Config 3			-98	
N_{oc}	Config 1	dBm/S	-98		
Config 2		cs		-98	
	Config 3			-95	
Propagation condition	on		T	DL-C 300ns 100l	Hz

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

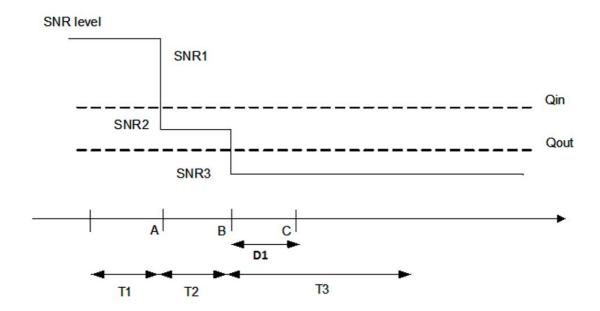


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration Description				
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz			
	is only required to pass in one of the supported test ations in FR1			

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active PCell			Cell 1	
RF Channel Number	-		1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52	
	Config 2		10: N _{RB,c} = 52	
	Config 3		40: N _{RB,c} = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET Reference	Config 1		CR.1.1 FDD	
Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 kHz	
subcarrier spacing	Config 3		30 kHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1	
	Config 3		Table A.3.8.2.1-1	
SSB index assigned as RLM RS			0	
	OCNG parameters		OP.1	
CP length			Normal	
Correlation Matrix and	Antenna		2x2 Low	
	Configuration		4.2	
-, -	Cl format		1-0	
	mber of Control DM symbols		2	
	gregation level	CCE	4	

	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dВ	0
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
-	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
T1	Config 3		TRS.1.2 TDD 0.2
T2		S	0.2
T3		S S	0.2
T4		S	0.04
T5		S	0.88
D1		S	0.84
NI A AU C		<u> </u>	0.07

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1			
		Ī	T1	T2	T3	T4	T5
EPRE ratio of PD	CCH DMRS to SSS	dB		_	4		
EPRE ratio of PD	CCH to PDCCH DMRS	dB			0		
EPRE ratio of PB	CH DMRS to SSS	dB					
EPRE ratio of PB	CH to PBCH DMRS	dB					
EPRE ratio of PS	S to SSS	dB			0		
EPRE ratio of PD	SCH DMRS to SSS	dB					
EPRE ratio of PD	SCH to PDSCH DMRS	dB					
EPRE ratio of OC	NG DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
SNR on other							
channels and	Config 1, 2, 3	dB	1				
signals							
N_{oc}	Config 1	dBm/15	-98				
¹ V _{oc}	Config 2	kHz	-98				
Config 3					-98		
N_{oc}	Config 1	dBm/S			-98		
¹ Voc	Config 2	_ cs	-98				
	Config 3				-95		
Propagation cond	lition				TDL-C 300ns 100Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.6.5.1.4.1-4: Void
Table A.6.5.1.4.1-5: Void

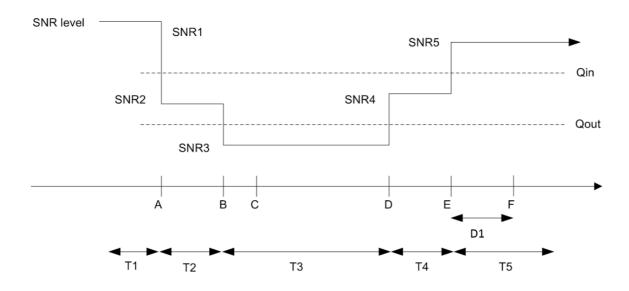


Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

A.6.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

Configu	ration Description	
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX mode

Active PCell Cell 1		Parameter	Unit	Value
Techannel Number				Test 1
Duplex mode				~~
TDD Configuration Config 1		One fire 4		<u> </u>
TDD Configuration	Duplex mode			
Config 2	TDD Configuration			I .
Config 3	TDD Configuration			
DL Initial BWP configuration DL BWP.0.1				
configuration Config 1, 2, 3 DLBWP.1.1 DL dedicated BWP configuration Config 1, 2, 3 UL BWP.0.1 UL initial BWP configuration Config 1, 2, 3 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2, 3 ULBWP.1.1 CORESET Reference Channel Config 2 Config 2 CR.1.1 FDD SSB Configuration Config 1 SSB.1 FR1 SSB Configuration Config 2 SSB.1 FR1 Config 3 SSB.2 FR1 SMTC Configuration Config 3 SSB.2 FR1 PDSCH/PDCH Config 3 SMTC.1 PDSCH/PDCCH Subcarrier spacing Config 1, 2 SMTC.1 TRS configuration Config 1 TRS.1.1 FDD Config 2 TRS.1.1 FDD TRS.1.1 FDD Config 3 TRS.1.1 FDD TRS.1.1 FDD Config 2 TRS.1.1 FDD Resource #4 in TRS.1.1 FDD Config 2 Resource #4 in TRS.1.1 FDD TCI configuration for PDCCH/PDSCH TCI.5 state.0 TCI configuration for PDCCH/PDSCH TCI.5 state.0 OP.1 COP length Normal 1-0	DL initial DWD			
configuration Config 1, 2, 3 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2, 3 ULBWP.1.1 CORESET Reference Channel Config 2 CR.1.1 TDD CR.1.1 FDD SSB Configuration Config 3 CR.2.1 TDD SSB.1 FR1 SSB Configuration Config 1 SSB.1 FR1 SSB.1 FR1 Config 2 Config 3 SSB.2 FR1 SSB.2 FR1 SMTC Configuration Config 3 SSB.2 FR1 PDSCH/PDCCH Config 1, 2 Config 3 SMTC.1 SMTC.1 TRS configuration Config 3 SMTC.1 TRS configuration Config 1 TRS.1.1 FDD CSI-RS for RLM Config 1 RS.1.1 TDD CSI-RS for RLM Config 2 TRS.1.1 TDD CSI-RS for RLM Config 1 Resource #4 in TRS.1.1 FDD COnfig 2 Resource #4 in TRS.1.1 FDD Config 3 Resource #4 in TRS.1.1 TDD TCI configuration for PDCCH/PDSCH TCI.State.0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 22 Aggregation level CCE 8 Ratio of hypothetical PDCCH Reenergy to average CSI-RS Reenergy Aggregation level GB <td>configuration</td> <td></td> <td></td> <td></td>	configuration			
configuration Config 1, 2, 3 ULBWP.1.1 CORESET Config 1 CR.1.1 TDD Reference Channel Federence Channel Config 2 CR.1.1 TDD SSB Configuration Config 1 SSB.1 FR1 SSB Configuration Config 1 SSB.1 FR1 SMTC Config 3 SSB.2 FR1 Config 3 SSB.2 FR1 Config 3 SSB.2 FR1 Config 3 SMTC.1 PDSCH/PDCCH Config 1, 2 SMTC.1 Config 3 SMTC.1 Config 3 30 kHz TRS configuration Config 1 TRS.1.1 FDD Config 2 TRS.1.1 FDD Config 3 TRS.1.1 FDD Config 3 TRS.1.1 FDD CSI-RS for RLM Config 1 Resource #A in TRS.1.1 FDD CSI-RS for RLM Config 1 Resource #A in TRS.1.1 FDD Config 2 Resource #A in TRS.1.1 FDD Config 3 Resource #A in TRS.1.2 TDD TCI configuration for PDCCH/PDSCH TCI.State.0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration	configuration			DLBWP.1.1
UL BWP.1.1		Config 1, 2, 3		ULBWP.0.1
Config 2 Config 3 SSB.1 FR1	UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
Reference Channel	CORESET	Config 1		CP 1 1 EDD
SSB Configuration				
SSB Configuration	NOTOTOTIOG OHATIHOI			
Config 2 SSB.1 FR1	SSB Configuration			
SMTC Configuration	COD Configuration			
SMTC Configuration Config 1, 2 Config 3 SMTC.1 PDSCH/PDCCH subcarrier spacing Config 3 30 kHz TRS configuration Config 1 TRS.1.1 FDD Config 2 TRS.1.1 TDD Config 3 TRS.1.2 TDD CSI-RS for RLM Config 1 Resource #4 in TRS.1.1 FDD Config 2 Resource #4 in TRS.1.1 TDD Config 3 Resource #4 in TRS.1.1 TDD TCI configuration for PDCCH/PDSCH TCI.State.0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 DMRS precoder granularity REG bundle size 6 DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T311 timer ms 0 T311 timer				
Config 3 SMTC.1	SMTC Configuration			
PDSCH/PDCH Subcarrier spacing	OWITO Comigaration			
Subcarrier spacing Config 3 30 kHz	PDSCH/PDCCH			
TRS configuration		<u> </u>		
Config 2	TRS configuration	•		
Config 3	Tree configuration			
CSI-RS for RLM				
Config 2	CSI-RS for RLM	<u> </u>		
Config 3 Resource #4 in TRS.1.2 TDD	OOI NO IOI NEW			
TCI configuration for PDCCH/PDSCH				
OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 DMRS energy to average CSI-RS RE energy RE energy REG bundle size DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1	TCI configuration for F	•		
CP length		DOCH DOCH		
Correlation Matrix and Antenna Configuration 2x2 Low Out of sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy dB 4 DMRS precoder granularity REG bundle size 6 DRX OFF Gap pattern ID Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1				
transmission parameters Number of Control OFDM symbols 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy dB 4 DMRS precoder granularity REG bundle size REG bundle size DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1		Antenna Configuration		
transmission parameters Number of Control OFDM symbols 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy dB 4 DMRS precoder granularity REG bundle size REG bundle size DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1	Out of sync	DCI format		1-0
Aggregation level	transmission			2
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	'		CCE	8
energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy dB 4 DMRS energy to average CSI-RS RE energy REG bundle size REG bundle size DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1		Ratio of hypothetical PDCCH RE		
DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size REG bundle size 6 DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1		energy		
DMRS precoder granularity REG bundle size REG bundle size 6 DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1		DMRS energy to average CSI-RS	dB	4
REG bundle size 6 DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1				DEC bundle size
DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1				
Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1	DRX	1.120 barraro dizo		
Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1				
T310 timer ms 0 T311 timer ms 1000 N310 1				
T311 timer ms 1000 N310 1			ms	
N310 1				
			-	
				1

CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1 s			0.44
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit				
			T1	T2	T3	
PDCCH_beta		dB		4		
PDCCH_DMRS	S_beta	dB		4		
PBCH_beta		dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_beta		dB				
OCNG_beta		dB				
SNR on	Config 1	dB	1	-7	-15	
RLM-RS	Config 2		1	-7	-15	
	Config 3		1	-7	-15	
SNR on other	Config 1	dB		1		
channels and	Config 2			1		
signals	Config 3			1		
λI	Config 1	dBm/15kHz	-98			
N_{oc} Config 1			-98			
	Config 3		-98			
Propagation condition			TDL-C 300ns 100Hz			
Note 1: OCN	IC shall be used	cuch that the recourees in	Call 1 are fully alle	acted and a constant t	atal transmitted	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
rieid	Value
gapOffset	0
Note 1: Void	

Table A.6.5.1.5.1-4: Void

Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

Cell 1 SNR level

Test Requirements

A.6.5.1.5.2

T2

SNR 3

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

D₁ ms

T3

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : :: I DIMD	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F	PDCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2	T2		0.2
T3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
PDCCH_beta		dB			4		
PDCCH_DMRS_beta		dB	4				
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB			0		
PDSCH_beta		dB					
OCNG_beta		dB					
SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
SNR on other	Config 1	dB	1				
channels and Config 2			1				
signals	Config 3		1				
N_{oc}	Config 1	dBm/15kHz			-98		
	Config 2				-98		
	Config 3				-98		•
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.6.1-4: Void

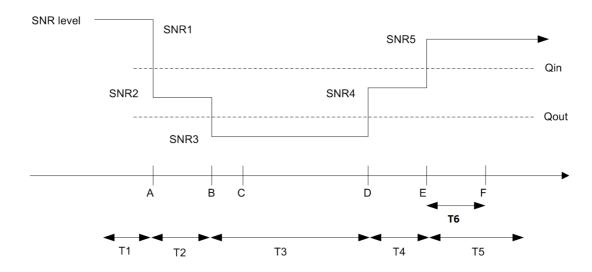


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
BL 1 W 1 BWB	Config 3		TDDConf.2.1	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 kHz	
subcarrier spacing	Config 3		30 kHz	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2	TRS.1.1 TDD		
	Config 3		TRS.1.2 TDD	
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD	
	Config 2		Resource #4 in TRS.1.1 TDD	
	Config 3 Resource #4 in T		Resource #4 in TRS.1.2 TDD	
	configuration for PDCCH/PDSCH		TCI.State.0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna Configuration			2x2 Low	
Out of sync	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	DRX.3		DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering	yer 3 filtering		Enabled	
T310 timer	10 timer		0	
T311 timer	311 timer		1000	
N310	N310		1	
N311	311		1	
CSI-RS configuration	onfiguration Config 1 CSI-RS.1.1 FDI		CSI-RS.1.1 FDD	
for CSI reporting	Config 2	CSI-RS.1.1 TDD		
	Config 3		CSI-RS.2.1 TDD	
T1	s 0.2		0.2	
T2	2		1.28	
T3		S	1.28	
D1		S	1.24	
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.		

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1			
			T1	T2	T3	
PDCCH_beta		dB	4			
PDCCH_DMRS_beta		dB	4			
PBCH_beta		dB				
PSS_beta		dB	0			
SSS_beta		dB				
PDSCH_beta		dB				
OCNG_beta		dB				
SNR on RLM-RS	Config 1	dB	1	-7	-15	
	Config 2		1	-7	-15	
	Config 3	Ti T	1	-7	-15	
SNR on other	Config 1	dB	1 1			
channels and	Config 2					
signals	Config 3			1	•	
N_{oc}	Config 1	dBm/15kHz	-98			
	Config 2		-98			
	Config 3			-98		
Propagation condition			TDL-C 300ns 100Hz			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.7.1-4: Void

Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void

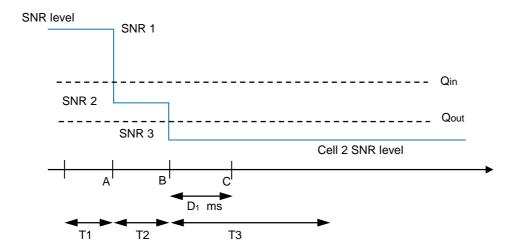


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : :: I DIMD	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy				
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy			dB	4
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size 6 1-0 Number of Control OFDM 2 2 2 2 2 2 2 2 3 3				
DMRS energy to average CSI-RS RE energy			dB	4
DMRS precoder granularity REG bundle size 6		DMRS energy to average CSI-RS		
REG bundle size				
DCI format				
Number of Control OFDM Symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size 6 DRX.3 Gap pattern ID Gap potential timer State				6
Symbols Aggregation level CCE	,			
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size 6 DRX.3 Gap pattern ID Enabled Enabled T310 timer ms 2000 T311 timer ms 1000 T311 timer ms 1000 T311 timer ms 1000 T311 timer ms 1000 T311 timer T1 T1 T2 T3 T3 T4 T4 T4 T4 T4 T4	parameters			2
energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size		Aggregation level	CCE	4
DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle size Res bundle s		energy to average CSI-RS RE energy	dB	0
REG bundle size 6 DRX DRX.3 Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 2000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD Cor CSI reporting CSI-RS.1.1 TDD T1 s 0.2 T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84		DMRS energy to average CSI-RS	dB	0
DRX DRX.3 Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 2000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD Config 2 CSI-RS.1.1 TDD T1 s 0.2 T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84		DMRS precoder granularity		REG bundle size
Gap pattern ID		REG bundle size		6
Layer 3 filtering Enabled T310 timer ms 2000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD Config 2 CSI-RS.1.1 TDD Config 3 CSI-RS.2.1 TDD T1 s 0.2 T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84				DRX.3
T310 timer ms 2000 T311 timer ms 2000 T311 timer ms 1000 N310 1 1 N311 1 CSI-RS.1.1 FDD CSI-RS configuration for CSI reporting Config 2 CSI-RS.1.1 TDD CSI-RS.2.1 TDD T1 s 0.2 T2 s 0.2 T3 s 0.2 T3 s 0.2 T4 s 0.2 T5 s 1.88 T6 s 1.84				01
T311 timer ms 1000 N310 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD Config 2 CSI-RS.1.1 TDD T1 s 0.2 T2 s 0.2 T3 s 0.2 T3 s 0.2 T3 s 0.2 T5 s 1.88 T6 s 1.84				
N310 1 N311 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD Config 2 CSI-RS.1.1 TDD Config 3 CSI-RS.2.1 TDD T1 \$ 0.2 T2 \$ 0.2 T3 \$ 1.24 T4 \$ 0.2 T5 \$ 1.88 T6 \$ 1.84	T310 timer		ms	2000
N311 1 CSI-RS configuration for CSI reporting Config 1 CSI-RS.1.1 FDD For CSI reporting Config 2 CSI-RS.1.1 TDD T1 S 0.2 T2 S 0.2 T3 S 1.24 T4 S 0.2 T5 S 1.88 T6 S 1.84			ms	1000
CSI-RS configuration				<u> </u>
For CSI reporting Config 2 CSI-RS.1.1 TDD Config 3 CSI-RS.2.1 TDD T1 \$ 0.2 T2 \$ 0.2 T3 \$ 1.24 T4 \$ 0.2 T5 \$ 1.88 T6 \$ 1.84				•
Config 3 CSI-RS.2.1 TDD T1 s 0.2 T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84				
T1 s 0.2 T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84	for CSI reporting	Config 2		
T2 s 0.2 T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84		Config 3		CSI-RS.2.1 TDD
T3 s 1.24 T4 s 0.2 T5 s 1.88 T6 s 1.84	T1		S	0.2
T4 s 0.2 T5 s 1.88 T6 s 1.84			S	0.2
T5 s 1.88 T6 s 1.84	T3		S	1.24
T6 s 1.84	T4		S	0.2
1.4	T5		S	1.88
Note 1: UE-specific PDCCH is not transmitted after T1 starts.	T6		S	1.84
	Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
PDCCH_beta		dB			4		
PDCCH_DMRS							
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB			0		
PDSCH_beta		dB	dB				
OCNG_beta		dB					
SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
SNR on other	Config 1	dB			1		
channels and	Config 2		1				
signals	Config 3				1		
M	Config 1	dBm/15kHz	-98			•	
N_{oc}	Config 2				-98	•	•
	Config 3				-98		
Propagation co	ndition			TD	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 1			
	Field				
	gapOffset	0			
Note 1:	Void				

Table A.6.5.1.8.1-4: Void

Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

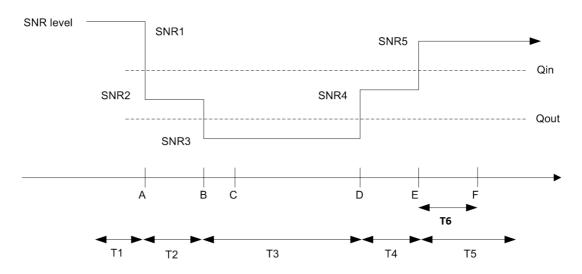


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2 Interruption

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.6.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2 and A 6.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD – TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parame	ter	Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Confiq 3		TDD	FDD
	Confiq 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Confiq 4		Not Applicable	TDDConf.1.1
	Confiq 5		TDDConf.1.2	TDDConf.1.2
BW _{channel}	Config 1,2,3,4		10 MHz: N _{RB,c} = 52	10 MHz: N _{RB,c} = 52
	Config 5		40 MHz: N _{RB,c} = 106	40 MHz: N _{RB,c} = 106
Initial BWP			DLBWP.0.2 ^{Note6}	
Configuration				
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Confiq 4		SR.1.1 FDD	SR.1.1 TDD
	Confiq 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Confiq 4		CR.1.1 FDD	CR.1.1 TDD
	Confiq 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD

	Config 4		CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	SSB.1 FR1
	Config 5		SSB.2 FR1	SSB.2 FR1
Correlation Matrix and Ar	itenna		1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMR				_
EPRE ratio of PDCCH to PD		dB	0	0
EPRE ratio of PDSCH DMR		-		
EPRE ratio of PDSCH to PD				
EPRE ratio of OCNG DMRS EPRE ratio of OCNG to OCN				
Noc Note 2	NG DIVIRS (Note 1)	dBm/15		
INOC		kHz	-104	-104
SS-RSRP Note 3		dBm/15 kHz	-87	-87
Ê _s /I _{ot}		dB	17	17
Ê _s /N _{oc}		dB	17	17
N _{oc} Note 2	Config 1,2,3,4	dBm/S	-104	-104
	Config 5		-101	-101
Io ^{Note3}	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Time offset to Cell1 Note 5		μs	-	3
Propagation Condition			AWGN	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Void
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3].

A.6.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on PCell shall not exceed the value defined in Table A.6.5.2.1.2-1 if the PCell is not in the same band as the deactivated SCell or Table A.6.5.2.1.2-2 if the PCell is in the same band as the deactivated SCell.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3 SCell Activation and Deactivation Delay

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $(n+T_{HARQ}+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3, and any PCell interruption due to the deactivation shall occur in the slot $(n+1+[T_{HARQ}+3ms])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	s only required to be tested in one of the supported test configurations

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
Т3	s	1	During this time the UE shall deactivate the SCell.
THARQ	slot	k	k is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by dl-DataToUL-ACK, the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
T _{CSI_Reporting}	ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]

Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	Т	1	T2		T3	
		Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Dunlay made	Config 1				F	DD		
Duplex mode	Config 2,3		TDD					

TDD configuration Config 2			Not applicable TDDConf.1.1						
1DD configuration	Config 3	-			TDDC				
DIM	Config 1,2	MHz	10: N _{RB,c} = 52						
BVVchannel	BW _{channel} Config 3		40: N _{RB,c} = 106						
Initial BWP configuration	n				DLBW	/P.0.2			
TCI state					TCI.S	tate.0			
TRS Configuration					TRS.1.	1 TDD			
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD		
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Dedicated CORESET parameters	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	
	Config 3		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD		
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET parameters	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD		
OCNG Patterns			OP.1						
	Config 1,2		SSB.1 FR1						
1 3 1 1	Config 3				SSB.2	2 FR1			
SMTC configuration					SMT	TC.1			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0						
$N_{oc}^{$	Config 1,2,4,5				-10	04			
Config 3,6		dBm/15kHz	-101						
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$			17						
\hat{E}_s/N_{oc}	T = "	dB			1				
SS-RSRP ^{Note3}	Config 1,2,4,5 Config 3,6	dBm/SCS			8- 8-				

SCH_RP Note 3		dBm/15 kHz	-87				
Propagation condition		-	AWGN				
Note 1:	OCNG shall be used such that bot density is achieved for all OFDM s		allocated and a constant total transmitted power spectral				
Note 2:	Interference from other cells and r	noise sources no	ot specified in the test is assumed to be constant over /GN of appropriate power for N_{oc} to be fulfilled.				
Note 3:	SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 4:	The uplink resources for CSI repo	porting are assigned to the UE prior to the start of time period T2.					

A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a slot $(n+T_{HARQ}+3ms)$.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, $T_{activation_time}=[5 \text{ ms}+T_{SMTC_SCell}]$, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ($n+[T_{HARQ}+3ms]$), as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $(n+1+[T_{HARQ}])$ to $(n+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in clause 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot $(n+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting}) as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell measurement cycle

A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle	ms	320	
(measCycleSCell)	1113	320	

A.6.5.3.2.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[T_{SMTC_MAX} + T_{SMTC_SCell} + 5ms]$.

A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.1.1-1. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $(n+T_{HARQ}+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}]+3ms)$

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3, and any PCell interruption due to the deactivation shall occur in the slot $(n+1+[T_{HARQ}+3ms])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.6.5.3.3.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [5 ms+2* T_{SMTC_MAX} +2* T_{SMTC_SCell}] as defined in clause 8.3.

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4: Void

A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode

9	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth,
	mode	TDD duplex mode;
		SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex
		mode
Note:	The UE is only required to be tested in one of the supported	test configurations

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test	Value	Comment
	5	configuration		
RF Channel		Config 1,2,3, 4,	1, 2	Three radio channels are used for these
Number		5, 6, 7, 8, 9		two tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
-		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement		Config 1,2,3, 4,	OFF	
gap pattern Id		5, 6, 7, 8, 9		
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		-
T1	_	Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Parameter	Unit	Test	Test 1	Test 2
		Configuration	T1 T2 T3	T1 T2 T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	2	2
		Conf 1, 2, 3	N/A	N/A
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1	TDD Conf.1.1
		Conf 7, 8, 9	TDD Conf.2.1	TDD Conf.2.1
		Conf 1, 2, 3	10: $N_{RB,c} = 52$	10: N _{RB,c} = 52
BW _{channel}	MHz	Conf 4, 5, 6	10: $N_{RB,c} = 52$	10: N _{RB,c} = 52
		Conf 7, 8, 9	40: $N_{RB,c} = 106$	40: N _{RB,c} = 106
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD	SR.1.1 FDD
measurement		Conf 4, 5, 6	SR.1.1 TDD	SR.1.1 TDD
channel as defined in A.3.1.1		Conf 7, 8, 9	SR 2.1 TDD	SR 2.1 TDD
RMSI CORESET		Conf 1, 2, 3	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 4, 5, 6	CR.1.1 TDD	CR.1.1 TDD
measurement channel as defined in A.3.1.2		Conf 7, 8, 9	CR.2.1 TDD	CR.2.1 TDD
RMC CORESET		Conf 1, 2, 3	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 4, 5, 6	CCR.1.1 TDD	CCR.1.1 TDD
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	CCR.2.1 TDD	CCR.2.1 TDD
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	OP.1	OP.1
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1	SSB.1 FR1
J		Conf 7, 8, 9	SSB.2 FR1	SSB.2 FR1
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	SMTC.1	SMTC.1
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1	ULBWP.1.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS EPRE ratio of PDCCH_DMRS EPRE ratio of PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0	0

EDDE : (1						
EPRE ratio of								
OCNG DMRS to								
SSS								
EPRE ratio of								
OCNG to OCNG								
DMRS								
- 	dBm /	Conf 1, 2, 3, 4,		-102			-102	
	15kHz	5, 6, 7, 8, 9						
Note 2	alDirec/	Conf		-102			-102	
οι	dBm/	1,2,3,4,5,6						
	SCS	Conf 7,8,9		-99		-99		
ê/N	-ID	Conf 1, 2, 3, 4,	16	16	16	16	16	16
\hat{E}_s/N_{oc}	dB	5, 6, 7, 8, 9						
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$ Note 3	ı.	Conf 1, 2, 3, 4,	16	16	16	16	16	16
$\mathrm{E}_{_{\mathrm{S}}}/\mathrm{I}_{\mathrm{ot}}$ Note 3	dB	5, 6, 7, 8, 9						
	dDm/	Conf	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3	dBm/	1,2,3,4,5,6						
	SCS	Conf 7,8,9	-83	-83	-83	-83	-83	-83
	dBm/	Conf	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	9.36	1,2,3,4,5,6						
I Note 2	MHz							
lo Note 3	dBm/	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	38.16	, , , , ,						
	MHz							
Propagation	1	Conf 1, 2, 3, 4,		AWGN	1		AWGN	ı
Condition		5, 6, 7, 8, 9						
Antenna		Conf 1, 2, 3, 4,		1 x 2			1 x 2	
configuration		5, 6, 7, 8, 9						

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: $\hat{E}_{_{\! S}}/I_{_{\! Ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		3			3	
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1	
		Conf 1, 4, 7		10: N _{RB,c} = 5			10: $N_{RB,c} = 52$	
BW _{channel}	MHz	Conf 2, 5, 8		10: $N_{RB,c} = 5$			10: $N_{RB,c} = 52$	
		Conf 3, 6, 9		40: N _{RB,c} = 1		4	$10: N_{RB,c} = 100$	6
		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		G-FR1-	
			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
			A3-10 in [13]	in [13]	[13]		[13]	
		Conf 2, 5, 8	G-	G-FR1-	G-FR1-			
PUSCH parameters		COIII 2, 5, 6	FR1-	A3-10	A3-10 in		G-FR1-	
for NR UL carrier			A3-10	in [13]	[13]	N/A	A3-10 in	N/A
			in [13]	[]	[]		[13]	
		Conf 3, 6, 9	Ğ-	G-FR1-	G-FR1-		C ED4	
			FR1-	A3-14	A3-14 in	N/A	G-FR1- A3-14 in	N/A
			A3-14	in [13]	[13]	IN/A	[13]	IN/A
			in [13]				[10]	
		Conf 1, 4, 7	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
			.2-1 in [13]	2-1 in [13]	-1 in [13]			
		Conf 2, 5, 8	Table	Table	Table			
PUCCH parameters		00111 2, 0, 0	8.3.3.1	8.3.3.1.	8.3.3.1.2			
For NR UL carrier			.2-1 in	2-1 in	-1 in [13]	N/A	N/A	N/A
			[13]	[13]				
		Conf 3, 6, 9	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
			.2-2 in	2-2 in	-2 in [13]	,, .		,, .
		Conf 1 4 7	[13]	[13] G-FR1-		G-FR1-	G-FR1-	G-FR1-
		Conf 1, 4, 7	N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
			IN/A	in [13]	IN/A	[13]	[13]	[13]
PUSCH parameters		Conf 2, 5, 8		G-FR1-		G-FR1-	G-FR1-	G-FR1-
for supplementary		, ,	N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
UL				in [13]		[13]	[13]	[13]
		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
		Conf 1 1 7		in [13]		[13]	[13]	[13]
		Conf 1, 4, 7	N/A	N/A	N/A	Table 8.3.3.1.2	Table 8.3.3.1.2	Table 8.3.3.1.2
			IN/A	IN/A	IN/A	-1 in [13]	-1 in [13]	-1 in [13]
BUOGLI :		Conf 2, 5, 8					Table	
PUCCH parameters		_, _, _,	NI/A	NI/A	NI/A	Table	8.3.3.1.2	Table
for supplementary UL			N/A	N/A	N/A	8.3.3.1.2	-1 in	8.3.3.1.2
OL						-1 in [13]	[13]	-1 in [13]
		Conf 3, 6, 9				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
DDCCII reference		Conf 4 4 7		CD 4 4 ED		-2 in [13]	-2 in [13]	-2 in [13]
PDSCH reference measurement		Conf 1, 4, 7 Conf 2, 5, 8		SR.1.1 FD			<u>SR.1.1 FDD</u> SR.1.1 TDD	
channel as defined		Conf 3, 6, 9		SR.1.1 TD				
in A.3.1.1				SR 2.1 TD			SR 2.1 TDD	
		Conf 1, 4, 7		CR.1.1 FD	ט		CR.1.1 FDD	1

RMSI CORESET	Conf 2, 5, 8		CR.1.1 TDI	<u> </u>		CR.1.1 TDD	\
reference	Conf 3, 6, 9		OK. I. I I DL	,	'	<u> </u>	•
measurement	Join J, U, 3		an a · ===			an a : ====	
channel as defined		1	CR.2.1 TDI)	'	CR.2.1 TDD)
in A.3.1.2							
RMC CORESET	Conf 1, 4, 7	C	CR.1.1 FD	D	C	CR.1.1 FDI)
reference	Conf 2, 5, 8		CR.1.1 TD		CCR.1.1 TDD		
measurement	Conf 3, 6, 9						
channel as defined			CR.2.1 TD	D	C	CR.2.1 TDI)
in A.3.1.3							
OCNG Pattern Note 1	Conf 1, 2, 3	OP.1			OP.1		
	Conf 1, 2, 4, 5,	SSB.1 FR1			SSB.1 FR1		
SSB configuration	7,8	55B.1 FK1			33D.11K1		
	Conf 3, 6, 9		SSB.2 FR1			SSB.2 FR1	
SMTC configuration	Conf 1, 2, 3, 4,		SMTC.1			SMTC.1	
	5, 6, 7, 8, 9		SIVITC. I			SIVITC.1	
	Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1	
configuration	5, 6, 7, 8, 9		DLDVVI .0.	1		DEDVII .U.1	
	Conf 1, 2, 3, 4,		DLBWP.1.	1		DLBWP.1.1	
configuration	5, 6, 7, 8, 9			'			
	Conf 1, 2, 3, 4,		ULBWP.1.	1		ULBWP.1.1	
configuration	5, 6, 7, 8, 9		OLDVVF.I.				
EPRE ratio of PSS							
to SSS							
EPRE ratio of							
PBCH_DMRS to							
SSS							
EPRE ratio of PBCH							
to PBCH_DMRS							
EPRE ratio of							
PDCCH_DMRS to							
SSS							
EPRE ratio of							
PDCCH to	Conf 1, 2, 3, 4,						
PDCCH_DIVIRS OB	5, 6, 7, 8, 9		0			0	
EPRE ratio of	5, 5, 7, 6, 8						
PDSCH_DMRS to							
SSS							
EPRE ratio of							
PDSCH to							
PDSCH_DMRS							
EPRE ratio of							
OCNG DMRS to							
SSS							
EPRE ratio of							
OCNG to OCNG							
DMRS							
	Conf 1, 2, 3, 4,		-102			-102	
15kHz	5, 6, 7, 8, 9				ļ		
Note 2 dBm/	Conf 1, 2, 4, 5,	-102			-102		
SCS -	7,8						
	Conf 3, 6, 9	-99			-99		
\hat{E}_s/N_{oc} dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
	5, 6, 7, 8, 9				.0		
$\hat{E}_{_{\! S}}/I_{_{\! ot}}$ Note 3 dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
	5, 6, 7, 8, 9				.0		
					1		l
dRm/	Conf 1, 2, 4, 5,	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3 dBm/ SCS	Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83

Io Note 3	dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
10	dBm/ 38.16 MHz	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	AWGN				AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2				1 x 2	

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_o to be fulfilled.

NOTE 3: \hat{E}_s/I_{ot} , lo, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.6.5.4.2 Void

A.6.5.5 Beam Failure Detection and Link recovery procedures

A.6.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.6.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.1.1-1, A.6.5.5.1.1-2, A.6.5.5.1.1-3 and A.6.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of

the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.6.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	•	Un	Value	Comment
		it	Test 1	
			2 !! .	
Active PSCell			Cell 1	
RF Channel Number	1 2 4 1		1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BWchannel	Config 1	M Hz	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.1.2	
CORESET Reference	Config 1		CR. 1.1 FDD	
Channel	Config 2		CR. 1.1 TDD	
	Config 3		CR. 2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 KHz	
subcarrier spacing	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.2-1	
	Config 3		Table A.3.8.2.2-1	
SSB Index assigned as B	SFD RS (q ₀)		0	

SSB Index assigned	as CBD RS (g ₁)		1	
OCNG parameters	40 0DD 110 (q1)		OP.1	
CP length			Normal	
Correlation Matrix ar	nd Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
parameters	symbols			
	Aggregation level	CC	8	
		E		
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to average CSI-RS			
	RE energy			
	Ratio of	dB	0	
	hypothetical	u _D	V	
	PDCCH DMRS			
	energy to			
	average CSI-RS			
	RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			OFF	
Gap pattern ID	- Tl I I - I		gp0	\A/I ₂ = (I ₂ =
rlmInSyncOutOfSync	cinresnoia		absent	When the field is
				absent, the
				UE applies
				the value 0.
				(Table 8.1.1-
				1).
rsrp-ThresholdSSB		dB	-98	Threshold
		m		used for
				Q _{out_LR_SSB}
powerControlOffsetS	SS		db0	Used for
				deriving rsrp-
				ThresholdCSI
beamFailureInstance	MaxCount		n1	-RS
Deamrailuremstance	eiviaxCourit		1111	see clause 5.17 of
				TS 38.321 [7]
beamFailureDetection	nTimer		pbfd4	see
			F~:W!	clause 5.17 of
				TS 38.321 [7]
CSI-RS	Config 1		[CSI-RS.1.1 FDD]	• •
configuration for	Config 2		[CSI-RS.1.1 TDD]	
CSI reporting	Config 3		[CSI-RS.2.3 TDD]	
CSI-RS for	Config 1		[TRS.1.1 FDD]	
tracking	Config 2		[TRS.1.1 TDD]	
	Config 3		[TRS.1.2 TDD]	
SSB Index		0,		
assigned as RLM		1		
RS T310 Timer	mo	10		
1310 Hiller	ms	10 00		
N310		2		
	<u>I</u>			I

T1	S	0.2	During this time the the UE shall be fully synchronized to cell 1
T2	S	0.37	
T3	S	0.24	
T4	S	0	
T5	S	0.17	
D1	S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit					
		-	T1	T2	Т3	T4	T5
EPRE ratio of	PDCCH DMRS to SSS	dB			•	•	•
EPRE ratio of	PDCCH to PDCCH DMRS	dB					
EPRE ratio of	PBCH DMRS to SSS	dB					
EPRE ratio of	PBCH to PBCH DMRS	dB					
EPRE ratio of	PSS to SSS	dB			0		
EPRE ratio of	PDSCH DMRS to SSS	dB					
EPRE ratio of	dB						
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of	OCNG to OCNG DMRS	dB					
SNR_SSB of	Config 1		5	-3	-12	-12	-12
set q ₀	Config 2	dB	5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
CND CCD of	Config 1		-12	-12	5	5	5
SNR_SSB of	Config 2	dB	-12	-12	5	5	5
set q ₁	Config 3		-12	-12	5	5	5
M	Config 1	dBm/15	-98				
N_{oc}	Config 2	KHz	-98				
	Config 3		-98				
Propagation c	ondition			TDL	-C 300ns 1	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.6.5.5.1.1-4: Measurement gap configuration for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

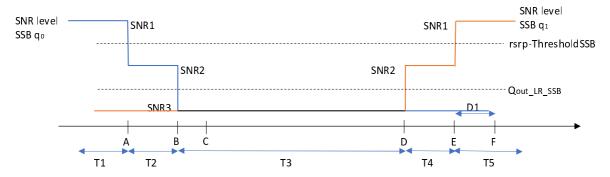


Figure A.6.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [120+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods,

with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description				
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Paramete	er	Uni	Value	Comment
		t	Test 1	
Active PSCell			Cell 1	
RF Channel Number	T -		1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BWchannel	Config 1	MH z	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
	Config 2	1	TDDConf.1.1	
	Config 3	1	TDDConf.1.2	
CORESET	Config 1		CR. 1.1 FDD	
Reference Channel	Config 2	1	CR. 1.1 TDD	
	Config 3		CR. 2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2]	SSB.3 FR1	
	Config 3		SSB.4 FR1	

SMTC Configurat	ion Config 1,		SMTC.1	
	2			
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1,		15 KHz	
subcarrier spacin			101412	
Subcarrier spacin	Config 3		30 KHz	
	•		30 KHZ	
PRACH	Config 1,		Table	
Configuration	2		A.3.8.2.2-1	
3	Config 3		Table	
	Oorning o		A.3.8.2.2-1	
CCD la dess ession				
SSB Index assign	ied as BFD RS		0	
(q ₀)				
SSB Index assign	ned as CBD RS		1	
(q ₁)				
OCNG parameter	'S		OP.1	
CP length			Normal	
Correlation Matrix	and Antenna		2x2 Low	
Configuration	and Antenna		ZAZ LOW	
	DCI format		1.0	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
parameters	symbols			
	Aggregation	CC	8	
	level	E		
	Ratio of	dB	0	
		uБ	U	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical	<u> </u>		
	PDCCH DMRS			
	energy to			
	average CSI-			
	RS RE energy			
	DMRS		REG bundle	
	precoder		size	
	granularity			
	REG bundle		6	
	size		· ·	
DRX	3120		DRX.7	A.3.3.7
				A.S.S.1
Gap pattern ID			N.A.	
rlmInSyncOutOfS	yncThreshold		Absent	When the
				field is
				absent, the
				UE applies
				the value 0.
				(Table 8.1.1-
T		-10	60	1).
rsrp-ThresholdSSB		dB	-98	Threshold
		m		used for
				$Q_{out_LR_SSB}$
powerControlOffs	etSS		db0	Used for
				deriving
				rsrp-
				ThresholdC
		1		SI-RS

beamFailureInsta	nooMovCount		n1	200
Deamrailureinsia	ncewaxcount		111	see clause 5.17
				of
				TS 38.321 [7
haara Fallana Data			l. f .l 4	1
beamFailureDetectionTimer			pbfd4	see
				clause 5.17
				of
				TS 38.321 [7
001.00	0		[00] D0 4 4	1
CSI-RS	Config 1, 4		[CSI-RS.1.1	
configuration for			FDD]	
CSI reporting				
	Config 2, 5		[CSI-RS.1.1	
			TDD]	
	Config 3, 6		[CSI-RS.2.1	
			TDD]	
CSI-RS for	Config 1, 4		[TRS.1.1 FDD]	
tracking				
	Config 2, 5		[TRS.1.1 TDD]	
	Config 3, 6		[TRS.1.2 TDD]	
SSB Index		0, 1		
assigned as				
RLM RS				
T310 Timer	ms	100		
		0		
N310		2		
T1		s	1	During this
				time the the
				UE shall be
				fully
				synchronize
				d to cell 1
T2		S	5.17	
T3		s	3.24	
T4		s	0	
T5		s	1.97	
D1		S	1.93	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1				
		T1	T2	Т3	T4	T5

Note 9:

clause [A.3.6].

EPRE ratio of PDCCH DMRS to SSS			dB						
EPRE ratio of PDCCH to PDCCH DMRS		dB							
EPRE ratio of PBCH DMRS to SSS		dB							
EPRE ratio	o of	PBCH to PBCH DMRS	dB						
EPRE ratio	o of	PSS to SSS	dB			0			
EPRE ratio	o of	PDSCH DMRS to SSS	dB						
EPRE ratio	o of	PDSCH to PDSCH DMRS	dB						
EPRE ratio	o of	OCNG DMRS to SSS	dB						
EPRE ratio	o of	OCNG to OCNG DMRS	dB						
SNR_SSB	of	Config 1		5	-3	-12	-12	-12	
set q ₀		Config 2	dB	5	-3	-12	-12	-12	
		Config 3		5	-3	-12	-12	-12	
OND OOD	- (Config 1	dB	-12	-12	5	5	5	
SNR_SSB	Oī	Config 2		-12	-12	5	5	5	
set q ₁		Config 3		-12	-12	5	5	5	
M		Config 1	dBm/15	-98					
N_{oc}		Config 2	KHz	-98					
		Config 3		-98					
Propagation	n co	ondition		TDL-C 300ns 100Hz					
Note 1:	OCI	NG shall be used such that the	e resources	in Cell 1 a	re fully allo	cated and a	constant t	otal	
		smitted power spectral density							
		uplink resources for CSI repo							
		PCSI-RS resource set configume period T1.	ration for C	SI reporting	g are assigi	ned to the l	JE prior to	the start	
			e accioned t	o the LIE n	rior to the s	tart of time	neriod T1		
	3								
T1.									
Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.									
		SNR in time periods T1, T2,					nd SNR3		
		pectively in figure A.4.5.5.1.1-1				,	. =		

Table A.6.5.5.2.1-4: Void Table A.6.5.5.2.1-5: Void

The SNR values are specified for testing a UE which supports 2RX on at least one band. For

testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in

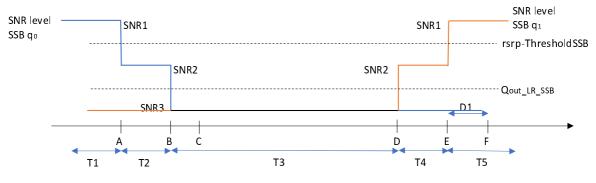


Figure A.6.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.6.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.3.1-1, A.6.5.5.3.1-2, and below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description				
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value Test 1	Comment
Active PCell		Cell 1	
RF Channel Number		1	

Duplex mode	Config 1			FDD	
Duplex mode	Config 1 Config 2,	2		TDD	
TDD	Config 1	3		Not Applicable	
Configuration	Config 2			TDDConf.1.1	
Comiguration	Config 3			TDDConf.1.2	
CORESET	Config 1			CR.1.1 FDD	A.3.1.2
Reference	Config 2			CR.1.1 TDD	Λ.υ.1.2
Channel	Config 3			CR.2.1 TDD	
SSB	Config 1			SSB.1 FR1	A.3.10
Configuration	Config 2			SSB.1 FR1	71.5.10
Comigaration	Config 3			SSB.2 FR1	
SMTC	Config 1,	2		SMTC.1	A.3.11
Configuration	Config 3	-		SMTC.1	71.0.11
PDSCH/PDC	Config 1,	2		15 KHz	
CH subcarrier					
spacing	Config 3			30 KHz	
csi-RS-Index as	signed as	beam		0	
failure detection				-	
OCNG paramet		1-		OP.1	A.3.2.1
CP length				Normal	
Correlation Mate	rix and Ant	enna		2x2 Low	
Configuration					
Beam failure	DCI form	at		1-0	
detection	Number	of Control		2	
transmission	OFDM sy	ymbols			
parameters	Aggregat	tion level	CCE	8	
	Ratio of I	nypothetical	dB	0	
		RE energy			
	to averag	ge CSI-RS			
	RE energ	ЭУ			
	Ratio of I	nypothetical	dB	0	
	PDCCH	DMRS			
	energy to	average			
	CSI-RS I	RE energy			
	DMRS p	recoder		REG bundle size	
	granulari				
	REG bur	ndle size		6	
DRX				OFF	
Gap pattern ID				N.A.	
csi-RS-Index as				1	N
beam detection					
rlmInSyncOutOf	SyncThres	shold		absent	When the field is
					absent, the UE
					applies the value 0.
					(Table 8.1.1-1).
rsrp-ThresholdS	SSB		dBm	-98	Threshold used for
					Q _{in_LR_SSB}
powerControlOf	fsetSS			db0	Used for deriving
					rsrp-ThresholdCSI-
				RS	
beamFailureInstanceMaxCount			n1	see clause 5.17 of	
hoomFoilureDatastic = Time =			or la Call A	TS 38.321 [7]	
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]	
CSI-RS configur	ration for	Config 1		CSI-RS.1.2 FDD	A.3.14
q ₀ and q ₁		Config 2		CSI-RS.1.2 TDD	
·		Config 3		CSI-RS.2.2 TDD	
CSI-RS configur	ration for	Config 1		CSI-RS.1.1 FDD	A.3.14
CSI reporting		Config 2		CSI-RS.1.1 TDD	
l		Config 3		CSI-RS.2.1 TDD	1

TRS configuration Config 1			TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned	Config 1		CSI-RS.1.2 FDD	A.3.14
as RLM RS	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1			0.2	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.18	
T3		S	0.14	
T4		S	0	
T5		S	0.08	
D1		S	0.04	
Note 1: UF-specific PD	CCH is not tra	nsmitted aft	er T1 starts.	

Table A.6.5.5.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDC	CH DMRS to SSS	dB					
EPRE ratio of PDC	CH to PDCCH DMRS	dB					
EPRE ratio of PBC	H DMRS to SSS	dB					
EPRE ratio of PBC	H to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB			0		
EPRE ratio of PDS	CH DMRS to SSS	dB					
EPRE ratio of PDS	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	IG DMRS to SSS	dB					
EPRE ratio of OCN	IG to OCNG DMRS	dB					
SNR_CSI-RS of	Config 1		5	-3	-12	-12	-12
set q ₀	Config 2	dB	5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR CSI-RS of	Config 1		-12	-12	5	5	5
_	Config 2	dB	-12	-12	5	5	5
set q ₁	Config 3		-12	-12	5	5	5
N_{oc}	Config 1	dBm/15	-98				
1 Voc	Config 2	KHz			-98		
	Config 3				-98		

Propagat	ion condition		TDL-C 300ns 100Hz		
Note 1:	OCNG shall be used such that the	resources	in Cell 1 are fully allocated and a constant total		
	transmitted power spectral density i	is achieve	ed for all OFDM symbols.		
Note 2:	The uplink resources for CSI report	ing are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configura	ation for C	SI reporting are assigned to the UE prior to the start		
	of time period T1.				
Note 4:	Measurement gap configuration is a	assigned t	to the UE prior to the start of time period T1.		
Note 5:	The timers and layer 3 filtering relat	ted param	eters are configured prior to the start of time period		
	T1.				
Note 6:			an the device under test as part of OCNG.		
Note 7:	SNR levels correspond to the signa	al to noise	ratio over the SSS REs.		
Note 8:	The SNR in time periods T1, T2, T3	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in figure A.4.5.5.1.1-1.				
Note 9:	The SNR values are specified for te	esting a U	E which supports 2RX on at least one band. For		
	testing of a UE which supports 4RX	on all ba	nds, the SNR during T3 is modified as specified in		
	clause [A.3.6].				

Table A.6.5.5.3.1-4: Void Table A.6.5.5.3.1-5: Void

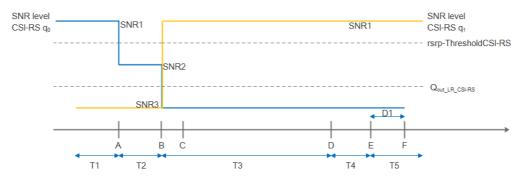


Figure A.6.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [30+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.4.1-1, A.6.5.5.4.1-2, A.6.5.5.4.1-3, and A.6.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

Cor	nfiguration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment	
			Test 1		
Active PCell			Cell 1		
RF Channel Num	ber		1		
Duplex mode	Config 1		FDD		
	Config 2, 3		TDD		
TDD	Config 1		Not Applicable		
Configuration	Config 2		TDDConf.1.1		
	Config 3		TDDConf.1.2		
CORESET	Config 1		CR.1.1 FDD	A.3.1.2	
Reference	Config 2		CR.1.1 TDD		
Channel	Config 3		CR.2.1 TDD		
SSB	Config 1		SSB.1 FR1	A.3.10	
Configuration	Config 2		SSB.1 FR1		
	Config 3		SSB.2 FR1		
SMTC	Config 1, 2		SMTC.1	A.3.11	
Configuration	Config 3		SMTC.1		
PDSCH/PDCC	Config 1, 2		15 KHz		
H subcarrier	Config 3	+	30 KHz		
spacing			30 KHZ		
csi-RS-Index ass	csi-RS-Index assigned as beam failure		[0]		
detection RS in s	et qo				

OCNG parameter	'S		OP.1	A.3.2.1
CP length	-		Normal	
Correlation Matrix	and Antenna	İ	2x2 Low	
Configuration				
Beam failure			1-0	
detection	Number of Control		2	
transmission	OFDM symbols			
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	0	
	PDCCH RE energy to			
	average CSI-RS RE			
	energy			
	Ratio of hypothetical	dB	0	
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy		DE0 1 " '	
	DMRS precoder		REG bundle size	
	granularity REG bundle size		6	
DRX	REG bundle size		6 DRX.7	A.3.3.7
Gap pattern ID			N.A.	A.3.3.1
	gned as candidate		1	
beam detection R			'	
rlmInSyncOutOfS			absent	When the field is
- Initial Cyric Cut Cit	ynermeeneid		aboont	absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-ThresholdSS	В	dBm	-98	Threshold used for
				Q _{in_LR_SSB}
powerControlOffs	etSS		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInsta	ncewaxCount		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDete	ctionTimer		pbfd4	see clause 5.17 of
bearin andrebetes	CHOTTIME		рыан	TS 38.321 [7]
CSI-RS	Config 1		CSI-RS.1.2 FDD	A.3.14
configuration for	Config 2		CSI-RS.1.2 TDD	.1
q₀ and q₁	Config 3		CSI-RS.2.2 TDD	
CSI-RS	Config 1		CSI-RS.1.1 FDD	A.3.14.1
configuration for	Config 2		CSI-RS.1.1 TDD	
CSI reporting	Config 3		CSI-RS.2.1 TDD	
TRS	Config 1		TRS.1.1 FDD	
configuration	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index	Config 1		CSI-RS.1.2 FDD	
assigned as	Config 2		CSI-RS.1.2 TDD	
RLM RS	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	D 1 41 4 4
T1		S	1	During this time the
				the UE shall be
				fully synchronized to cell 1
T2		S	8.37	IO CEII I
T3		S	6.44	
T4		S	0.44	
T5		S	1.97	
D1		s	1.93	
	ecific PDCCH is not transi			

Table A.6.5.5.4.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Paramete	Unit	Test 1					
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DM	RS to SSS	dB					
EPRE ratio of PDCCH to P	DCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PB	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB			0		
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to OC	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1		5	-3	-12	-12	-12
	Config 2	dB	5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
	Config 1		-12	-12	5	5	5
SNR_CSI-RS of set q ₁	Config 2	dB	-12	-12	5	5	5
	Config 3		-12	-12	5	5	5
N_{oc}	Config 1	dBm/15			-98		
¹ voc	Config 2	KHz			-98		
	Config 3				-98		
Propagation condition			TDL-C 300ns 100Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total							

- transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 4:
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 Note 8: respectively in figure A.4.5.5.1.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 9: testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

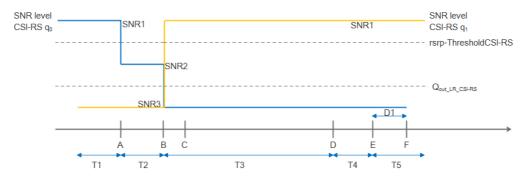


Figure A.6.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.6.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6 Active BWP switch

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.6.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters is specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in
 Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD -FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD - TDD duplex mode
Note 1:	The UE is only required to be tested in one of the supported test configurations

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this
		1, 2	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	[200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 2	ub	0	
Cell2 timing offset to cell1	นร	3	Time alignment error as specified in
	μδ	3	TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	s	0.2	
T3	S	0.2	

Table A6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.1.2	TDDConf.1.2
BWchannel	Config 1,2,3,4		10 MHz: N _{RB,c} = 52	10 MHz: N _{RB,c} = 52
	Config 5		40 MHz: N _{RB,c} = 106	40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2	3
Initial BWP Configuration	Initial BWP Configuration		DLBWF	P.0.2 ^{Note4}
Active BWP-1 Configura	tion		DLBWP.1.1 ^{Note4}	-
Active BWP-2 Configura	tion		DLBWP.1.3 ^{Note4}	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.1 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2	_	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD
	Config 4	1	CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
	OCNG Patterns		OP.1	
SSB Configuration	Config 1,2,3,4	<u> </u>	SSB.	1 FR1

	Config 5		SSB.:	2 FR1
SMTC Configuration			SMTC.1	
Correlation Matrix and A	Antenna		1x2	Low
Configuration				
EPRE ratio of PSS to S	SS	dB		
EPRE ratio of PBCH DN	MRS to SSS	<u> </u>		
EPRE ratio of PBCH to	PBCH DMRS	<u> </u>		
EPRE ratio of PDCCH [DMRS to SSS	<u> </u>		
EPRE ratio of PDCCH t	o PDCCH DMRS	<u> </u>		
EPRE ratio of PDSCH [DMRS to SSS	<u> </u>	0	0
EPRE ratio of PDSCH t	o PDSCH			
EPRE ratio of OCNG D	MRS to SSS(Note			
1)		<u>_l</u>		
EPRE ratio of OCNG to	OCNG DMRS			
(Note 1)				
N _{oc} Note 2	Config 1,2,3,4	dBm/SCS	[-104	[-104
(Config 5		[-110	[-110
N _{oc} Note 2		dBm/15KH	[-104	[-104
		Z		
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	[-87	[-87
	Config 5		[-90	[-90
Ês/I _{ot}		dB	[17	[17
Ê _s /N _{oc}		dB	[17	[17
IoNote3	Config 1,2,3,4	dBm/	[-59	[-59
	Corning 1,2,3,4	9.36MHz		
Config 5		dBm/	[-61.9	[-61.9
	Coning 5	38.16MHz		
Propagation Condition			AWGN	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3 SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i + T_{BWPswitchDelay} + kI)$, $(j + T_{BWPswitchDelay} + kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.6.5.6.1.2.1-1.

The test scenario comprises of one NR cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the NR cell are specified in Table A.6.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell1's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

 $During \ T2, the \ test \ equipment \ won't \ transmit \ DCI \ format \ for \ PDSCH \ reception \ on \ Cell 1.$

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell1's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell1's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.6.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations.
Note 2:	A UE which fulfil	s the requirements in test case A.6.5.6.1.1 can skip the test cases in A.4.5.6.1.2.

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	[200]	
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.1.2
BW _{channel}	Config 1		10 MHz: N _{RB,c} = 52
	Config 2		10 MHz: N _{RB,c} = 52
	Config 3		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP	Config 1 0 0		
Configuration	Config 1,2,3		DLBWP.0.2 Note 4
Active DL BWP-1	Config 1 0 0		
Configuration	Config 1,2,3		DLBWP.1.1 Note 4
Active DL BWP-2	Config 1,2,3		
Configuration	Corning 1,2,3		DLBWP.1.3 Note 4
Initial UL BWP	Config 1,2,3		
Configuration	Cornig 1,2,3		ULBWP.0.2 Note 4
Active UL BWP-1	Config 1,2,3		
Configuration	Coming 1,2,0		ULBWP.1.1 Note 4
Active UL BWP-2	Config 1,2,3		
Configuration	• • •		ULBWP.1.3 Note 4
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD
parameters	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD

OCNG Patterns			OP.1	
SSB Configuration	Config 1,2		SSB.1 FR1	
COD Conniguration	Config 3		SSB.2 FR1	
SMTC Configuration	Coming C		SMTC.1	
Correlation Matrix and	Antenna		1x2 Low	
Configuration	7 11 10 11 10			
TRS Configuration	Config 1,4		TRS.1.1 FDD	
J	Config 2,5		TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	
EPRE ratio of PSS to S		dB	0	
EPRE ratio of PBCH D		1		
EPRE ratio of PBCH to				
EPRE ratio of PDCCH				
EPRE ratio of PDCCH				
EPRE ratio of PDSCH		1		
EPRE ratio of PDSCH		1		
EPRE ratio of OCNG [
1)	•			
EPRE ratio of OCNG t	o OCNG DMRS			
(Note 1)				
Noc ^{Note 2}	Config 1,2	dBm/SCS	[-104]	
	Config 3		[-101]	
N _{oc} Note 2	N _{oc} Note 2		[-104]	
		z		
SS-RSRP Note 3	Config 1,2	dBm/SCS	[-87]	
	Config 3		[-90]	
Ê _s /I _{ot}		dB	[17]	
Ê _s /N _{oc}		dB	[17]	
Io ^{Note3}	Config 1,2	dBm/	[-59]	
	Corning 1,2	9.36MHz		
	Config 3	dBm/	[-61.9]	
	Joining 5	38.16MHz		
	Propagation Condition		AWGN	
			y allocated and a constant	
total transmitted power spectral density is achieved for all OFDM symbols.				
Note 2: Interference from other cells and noise sources not specified in the test is				
assumed to be constant over subcarriers and time and shall be modelled as				
AWGN of appropriate power for Noc to be fulfilled.				
Note 3: SS-RSRP and lo levels have been derived from other parameters for				
information purposes. They are not settable parameters themselves. Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is				
linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is				
linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].				

A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for Cell1 in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK for Cell1 in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.6.5.6.2 RRC-based Active BWP Switch

A.6.5.6.2.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.6.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6. Supported test configurations are shown in Table A.6.5.6.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.6.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part configuration.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PCell's DL slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$) as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$). The UE shall be continuously scheduled on PCell's BWP-1 starting from the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.6.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	S	[0.2]	

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter		Unit	Cell 1	
Frequency	Range			FR1
Duplex mod	de	Config 1,4		FDD
·		Config 2,3,5,6	ĺ	TDD
TDD config	uration	Config 1,4		Not Applicable
		Config 2,5		TDDConf.1.1
		Config 3,6		TDDConf.1.2
BW _{channel}		Config 1,4		10 MHz: N _{RB,c} = 52
		Config 2,5]	10 MHz: N _{RB,c} = 52
		Config 3,6		40 MHz: N _{RB,c} = 106
Active BWF				1
Initial DL B		Config 1,4		DLBWP.0.2
Configuration	on	Config 2,5		
		Config 3,6		
Initial UL B	MD	Config 1,4		ULBWP.0.2
Configuration		Config 2,5]	
Corniguration		Config 3,6		
Initial	Active DL	Config 1,4		DLBWP.1.3
Condition	BWP-1	Config 2,5	_	
	Configurat ion	Config 3,6		
	Active UL	Config 1,4		ULBWP.1.3
	BWP-1	Config 2,5		
	Configurat ion	Config 3,6		
Final	Active DL	Config 1,4		DLBWP.1.1
Condition	BWP-1	Config 2,5	Ī	
	Configurat ion	Config 3,6		
	Active UL	Config 1,4		ULBWP.1.1
	BWP-1	Config 2,5	ĺ	
	Configurat ion	Config 3,6		
Initial UL B	WP	Config 1,4		ULBWP.0.2
Configuration	on	Config 2,5	İ	
_		Config 3,6	ĺ	
Active UL E	BWP-1	Config 1,4		ULBWP.1.3
Configuration	on	Config 2,5	ĺ	
		Config 3,6	1	
Active UL E	BWP-2	Config 1,4		ULBWP.1.1
Configuration	on	Config 2,5		
•		Config 3,6		
PDSCH Re	ference	Config 1,4		SR.1.1 FDD
measureme	ent channel	Config 2,5]	SR.1.1 TDD
		Config 3,6		SR2.1 TDD
		Config 1,4		CR.1.1 FDD

RMSI CORESET	Config 2,5		CR.1.1 TDD		
parameters	Config 3,6		CR2.1 TDD		
Dedicated CORESET	Config 1,4		CCR.1.1 FDD		
parameters	Config 2,5	}	CCR.1.1 TDD		
parameters	Config 3,6	1	CCR.2.1 TDD		
OCNG Patterns	Coming C,C		OP.1		
SSB Configuration	Config 1,2,4,5		SSB.1 FR1		
CCD Comigaration	Config 3,6	1	SSB.2 FR1		
SMTC Configuration	Coming 0,0		SMTC.1		
TRS Configuration	Config 1,4		TRS.1.1 FDD		
The comigaration	Config 2,5		TRS.1.1 TDD		
	Config 3,6		TRS.1.2 TDD		
Antenna Configuration	Coming 0,0		1x2		
Propagation Condition			AWGN		
EPRE ratio of PSS to SS	S	dB	0		
EPRE ratio of PBCH DM		,	ŭ		
EPRE ratio of PBCH to F					
EPRE ratio of PDCCH D					
EPRE ratio of PDCCH to					
EPRE ratio of PDSCH DI					
EPRE ratio of PDSCH to					
EPRE ratio of OCNG DM					
EPRE ratio of OCNG to 0	CNG DMRS(Note				
1)	SOITO DIVIITO				
N _{oc} Note 2		dBm/15	[-104]		
		kHz			
SS-RSRP Note 3		dBm/15	[-87]		
		kHz			
Ê _s /I _{ot}		dB	17		
Ê _s /N _{oc}		dB	17		
Io ^{Note3}	Carefig 4 0 4 5	dBm/	TBD		
	Config 1,2,4,5	9.36MHz			
	Config 3,6	dBm/	TBD		
		38.16MHz			
			y allocated and a constant		
	total transmitted power spectral density is achieved for all OFDM symbols				
			not specified in the test is		
			ne and shall be modelled		
as AWGN of appropriate power for N _{oc} to be fulfilled. Note 3: SS-RSRP and lo levels have been derived from other parameters for					
information purposes. They are not settable parameters themselve Note 4: Note 4: For unpaired spectrum, a DL BWP is linked with an UL BW					
	linked with ULBWP		1.1 is linked with 1.3 defined in clause 12 of		
		WILLI OLBWP.	i.s defined in clause 12 of		
TS 38.213 [3].					

A.6.5.6.2.2.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell in the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6 Measurement procedure

A.6.6.1 Intra-frequency Measurements

A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

Co	nfiguration	Description	
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations.		

Table A.6.6.1.1.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test	Value	Comment
		configur		
		ation		
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving		1	3 ms	Asynchronous cells.
and neighbour cells				The timing of Cell 2 is 3ms later
				than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Unit	Test	Ce	Cell 1		Cell 2	
	configuration	T1	T2	T1	T2	
	1				TN/A	
	3	TDDC	onf.2.1			
	1	SR.1.	1 FDD	N.	/A	
	2	SR.1.	1 TDD			
	3	SR.2.	1 TDD			
	1	CR.1.	1 FDD	CR.1.	1 FDD	
	2					
				N/A DLBWP.0.1		
	1, 2, 3			ULBWP.0.1		
	1 2 3				DLBWP.1.1	
	1, 2, 0	DLDVVF.1.1				
	1. 2. 3	ULBV	LILBWP 1 1		/P.1.1	
	., _, 0	0	OLDWI IIII		-	
	1, 2, 3	SSB SSB			SB	
dBm/SCS	1					
	2	-98				
	3					
dBm/15 kHz	1			.98		
	2					
	3					
dB	1	4	-1.46	-Infinity	-1.46	
	2					
	3					
dB	1	4	4	-Infinity	4	
	2					
	3					
dBm/SCS kHz	1	-94	-94	-Infinity	-94	
	2	-94	-94	-Infinity	-94	
	3	-91	-91	-Infinity	-91	
dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
dBm/9.36 MHz		-64.60	-62.25	64.60	-62.25	
10 /00 40 141	-	-58.50	FC 4C	58.50	-56.16	
dBm/38.16 MHz	3 1, 2, 3	-36.30	-56.16	36.50	-30.10	
	dBm/SCS dBm/15 kHz dB dB dB dBM/SCS kHz	configuration 1 2 3 1 2 3 1 2 3 1, 2, 3 1, 2, 3 1, 2, 3 1, 2, 3 1, 2, 3 4 2 3 dBm/SCS 1 2 3 dB 1 2 3 dBm/SCS kHz 1 2 3 dBm/9.36 MHz 1 dBm/9.36 MHz 1 dBm/9.36 MHz 1	configuration T1 1 TNDC 3 TDDC 3 TDDC 1 SR.1. 2 SR.1. 3 SR.2. 1 CR.1. 2 CR.1. 3 CR.2. 1 CCR.1 2 CCR.1 3 CCR.2 1, 2, 3 OF 1, 2, 3 OF 1, 2, 3 DLBW ULBW ULBW 1, 2, 3 ULBW 1, 2, 3 ULBW 1, 2, 3 ULBW 1, 2, 3 SS dBm/SCS 1 2 3 dB 1 4 2 3 dBm/SCS kHz 1 -94 2 -94 3 -91 dBm/9.36 MHz 1 -64.60 dBm/9.36 MHz 2 -64.60	configuration T1 T2 1 TN/A 2 TDDConf.1.1 3 TDDConf.2.1 4 SR.1.1 FDD 2 SR.1.1 TDD 3 SR.2.1 TDD 4 CR.1.1 FDD 2 CR.1.1 TDD 3 CR.2.1 TDD 4 CCR.1.1 TDD 3 CCR.2.1 TDD 4 TRS.1.1 FDD 3 TRS.1.1 FDD 4 TRS.1.1 TDD 3 TRS.1.2 TDD 4 1,2,3 DLBWP.0.1 ULBWP.0.1 1,2,3 DLBWP.0.1 ULBWP.0.1 ULBWP.1.1 1,2,3 SSB dBm/SCS 1 2 3 dBm/SCS 1 2 3 dBm/SCS kHz 1 4 -94 2 -94 3 -91 4 -94 3 -91	configuration T1 T2 T1 1 TN/A TN 2 TDDConf.1.1 TDDConf.2.1 3 TDDConf.2.1 TDDConf.2.1 1 SR.1.1 FDD N 2 SR.1.1 TDD N 3 SR.2.1 TDD CR.1. 1 CR.1.1 FDD CR.1. 2 CR.1.1 TDD CR.2. 1 CCR.1.1 FDD CCR.1. 2 CCR.1.1 TDD CCR.2. 3 CCR.2.1 TDD CCR.2. 4 CCR.2.1 TDD CCR.2. 3 CCR.2.1 TDD CCR.2. 4 TRS.1.1 FDD N 2 TRS.1.1 TDD N 3 TRS.1.2 TDD N 4 TRS.1.1 TDD N 1, 2, 3 DLBWP.0.1 DLBW 1, 2, 3 DLBWP.0.1 DLBW 1, 2, 3 SSB SS 3 -98 -98 3 -98 -98 <	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.2 SA event triggered reporting tests without gap under DRX

A.6.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.2.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.2.2-1, A.6.6.1.2.2-2 and A.6.6.1.2.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.2.2-1: Supported test configurations

Co	nfiguration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	ote: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.6.1.2.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Va	lue	Comment
		configur ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1	1	
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
SSB configuration		1	SSB.1 FR1		
_		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
_		2	SMTC.1		
		3	SMTC.1		

A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between serving		1	3 μs		Synchronous cells
and neighbour cells		2	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Се	ell 1	Cell 2		
		configuration	T1	T2	T1	T2	
TDD configuration		1	TI	V/A	TN	I/A	
		2		onf.1.1	TDDC	onf.1.1	
		3	TDDC	onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2		1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1		.1 FDD		.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD		.1 TDD	
configuration		3		2.1 TDD		.1 TDD	
OCNG Patterns		1, 2, 3		P.1	OF		
TRS configuration		1		.1 FDD		/A	
····g······		2		.1 TDD	N/A		
		3		.2 TDD N/A			
Ilnitial BWP		1, 2, 3	DLBV	VP.0.1	DLBWP.0.1		
configuration				ULBWP.0.1		ULBWP.0.1	
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBWP.1.1		
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBV	ULBWP.1.1	
configuration		4.0.0		00	0.0	<u> </u>	
RLM-RS	dBm/SCS	1, 2, 3	5		SB SSB		
N_{oc} Note 2	abm/scs	1			-98		
		2			-98		
	ID (45111	3			-95		
N_{oc} Note 2	dBm/15 kHz	1	_	-98			
		2 3	-				
	dB	1	4	-1.46	-Infinity	-1.46	
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$	uБ	2	-	-1.40	-iiiiiiity	-1.40	
		3	1				
/M	dB	1			-Infinity	4	
\hat{E}_s/N_{oc}	45	2	1 .				
		3	1				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	

lo	dBm/9.36 MI		1	-64.60	-62.25	64.60	-62.25
		dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
		dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagat	Propagation 1, 2, 3 AWGN			VGN			
Condition	l						
Note 1:	e 1: The resources for uplink transmission are assigned to the UE prior to the start of time period						
	T2.						
Note 2:	Interfere	Interference from other cells and noise sources not specified in the test is assumed to be					
	constant	constant over subcarriers and time and shall be modelled as AWGN of appropriate power for					
	N_{oc} to I	N_{oc} to be fulfilled.					
Note 3:		SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					

A.6.6.1.2.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX

A.6.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.3.1-1 and A.6.6.1.3.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.3.2-1: Supported test configurations

	Configuration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX	ms	1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	3 μs 5	
T2	S	1, 2, 3	5	

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test	Ce	II 1	Cell 2	
		configuration	T1	T2	T1	T2
TDD configuration		1	TN	I/A	TN	I/A
		2	TDDC	onf.1.1	TDDC	onf.1.1
		3	TDDC	onf.2.1	TDDC	onf.2.1
PDSCH RMC		1	SR.1.	1 FDD	N/A	
configuration		2	SR.1.	SR.1.1 TDD		
		3	SR.2.1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD
configuration		3	CR.2.1 TDD		CR.2.1 TDD	
Dedicated		1 CCR.1.1 FDD		.1 FDD	CCR.1.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD
configuration		3	CCR.2	.1 TDD	CCR.2	.1 TDD

OCNG Patterns		1, 2, 3	OF	P.1	OF	P.1
TRS configuration		1	TRS.1	.1.1 FDD N/A		/A
		2		RS.1.1 TDD N/A		
		3		.2 TDD	N/	
IInitial BWP		1, 2, 3	DLBV	VP.0.1	DLBW	/P.0.1
configuration		, , -	ULBV	VP.0.1	ULBW	
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBW	/P.1.1
configuration		, ,				
Active UL BWP		1, 2, 3	ULBV	VP.1.2	ULBW	/P.1.1
configuration		, ,				
RLM-RS		1, 2, 3	CSI	-RS	SS	SB
Note 2	dBm/SCS	1		-	-98	
TV oc		2		-	-98	
		3		-95		
M Note 2	dBm/15 kHz	1			-98	
$N_{oc}^{}$ Note 2		2				
		3				
ĉ /I	dB	1	4	-1.46	-Infinity	-1.46
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		2				
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
\mathbf{L}_{s}/N_{oc}		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation		1, 2, 3		AV	VGN	
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

Co	nfiguration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	lote: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and 0	Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 F	DD	
		2	CSI-RS.1.2 T	DD	
		3	CSI-RS.2.2 T	DD	

A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 3.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test	Ce	II 1	Cell 2		
		configuration	T1	T1 T2		T2	
TDD configuration		1	TN	I/A	TN/A		
		2		onf.1.1		Conf.1.1	
		3	TDDC	onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N,	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2	.1 TDD	CCR.2	.1 TDD	
OCNG Patterns		1, 2, 3	OF	P.1	OF	P.1	
TRS configuration		1		.1 FDD	N/A		
J		2	TRS.1	.1 TDD	N/A		
		3	TRS.1	.2 TDD	N/A		
Ilnitial BWP		1, 2, 3		VP.0.1	DLBWP.0.1		
configuration				VP.0.1	ULBWP.0.1		
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBWP.1.1		
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.2	ULBWP.1.1		
configuration		4.0.0	001	DO.	SSB		
RLM-RS	-ID (000	1, 2, 3	CSI	-RS)B	
N_{oc} Note 2	dBm/SCS	1	1		-98		
		2	1		-98		
	15 (4-11)	3	1		-95		
N_{oc} Note 2	dBm/15 kHz	1			-98		
		3	4				
^ /	dB	1	4	-1.46	Infinity	-1.46	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	uБ	2	- 4	-1.40	-Infinity	-1.40	
		3	1				
/N	dB	1	4	4	-Infinity	4	
\hat{E}_s/N_{oc}	45	2	╡			•	
		3	1				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	

		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation Condition		1, 2, 3	AWGN			

Note 1: Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Table A.6.6.1.4.2-1Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of

appropriate power for N_{oc} to be fulfilled.

Note 3: Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.1.4.2-4: Void

Table A.6.6.1.4.2-5: Void

A.6.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	s	1	5	

Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	Cell 1		II 2
		configuration	T1 T2		T1	T2
TDD configuration		1	N	/A	N	/A
PDSCH RMC		1	SR.1.	1 FDD	N	/A
configuration						
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD
RMC						
configuration						
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD
CORESET RMC						
configuration						
OCNG Patterns		1	OP.1 OP.1		P.1	
TRS configuration		1	TRS.1.1 FDD N/A		/A	
IInitial BWP		1	DLBV	VP.0,1	DLBV	√P.0.1
configuration			ULBV	√P.0.1	ULBV	VP.0.1
Active DL BWP		1	DLBV	VP.1.1	DLBV	VP.1.1
configuration						
Active UL BWP		1	ULBV	VP.1.1	ULBV	VP.1.1
configuration						
RLM-RS		1	SSB SSB		SB	
N_{oc} Note 2	dBm/SCS	1	-98			
N_{oc} Note 2	dBm/15 kHz	1	-98			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46

\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc} dB		1	4	4	-Infinity	4	
SS-RSRF	Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
lo		dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
Propagati	ion		1	AWGN				
Condition								
Note 1:	Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2							
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for								
	N_{oc} to I	oe fulfilled.						

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading

A.6.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.6.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.6.2-1 and A.6.6.1.6.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.6.2-1: Supported test configurations

Configuration	Description			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			

Table A.6.6.1.6.2-2: General test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	S	1	5	

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	Cell 1		II 2	
		configuration	T1 T2		T1	T2	
TDD configuration		1	N	N/A N/A		/A	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration		4	CCD 4	4 EDD	CCD 4	4 EDD	
Dedicated CORESET RMC		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
configuration							
OCNG Patterns		1	0	OP.1		P.1	
TRS configuration		1	TRS.1	TRS.1.1 FDD		N/A	
Ilnitial BWP		1	DLBV	VP.0.1	DLBV	√P.0.1	
configuration			ULBV	VP.0.1	ULBV	VP.0.1	
Active DL BWP		1	DLBV	VP.1.2	DLBW	VP.1.1	
configuration							
Active UL BWP		1	ULBV	VP.1.2	ULBWP.1.1		
configuration							
RLM-RS		1	CS			SB	
N_{oc} Note 2	dBm/SCS	1	-98				
N_{oc} Note 2	dBm/15 kHz	1	-98				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	

\hat{E}_s/N_{oc}	$/N_{oc}$ dB		1	4	4	-Infinity	4	
SS-RSRF	Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
lo		dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
Propagat	ion		1	AWGN				
Condition	1							
Note 1:	The reso	urces for uplink trans	mission are assigned	to the UE	orior to the	start of time	e period	
Note 2:	•							
	N_{oc} to I	oe fulfilled.						
Note 3:		P levels have been de		meters for	information	n purposes.	They are	

A.6.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2 Inter-frequency Measurements

A.6.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.6.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.1.1-1, A.6.6.2.1.1-2 and A.6.6.2.1.1-3.

In test 1 measurement gap pattern configuration #0 as defined in Table A.6.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	The UE is only required to be tested in one of the supported test configurations			
Note 2:	target NR cell has the same SCS. BW and duplex mode as NR serving cell				

Table A.6.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment	
		configurati on	Test 1	Test 2		
NR RF Channel Number		Config 1,2,3	1	, 2	Two FR1 NR carrier frequencies is used.	
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.	
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.	
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.	
Measurement gap offset		Config 1,2,3	39	9		
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1	
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1	
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1	
A3-Offset	dB	Config 1,2,3	-6			
Hysteresis	dB	Config 1,2,3	0			
CP length		Config 1,2,3	Normal			
TimeToTrigger	S	Config 1,2,3	0			
Filter coefficient		Config 1,2,3	0		L3 filtering is not used	
DRX		Config 1,2,3	OFF		DRX is not used	
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3μs		Synchronous cells.	
T1	S	Config 1,2,3	5			
T2	S	Config 1,2,3	1	1		

Table A.6.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Ce	Cell 1		ell 2
		configuratio	T1	T2	T1	T2
		n				
NR RF Channel Number		Config 1,2,3	1	1	2	
Duplex mode		Config 1			-DD	
		Config 2,3		-	ΓDD	
TDD configuration		Config 1		Not Applicable		
		Config 2		TDDConf.1.1		
		Config 3		TDDConf.2.1		
BW _{channel}	MHz	Config 1,2	10: N _{RB,c} = 52			
		Config 3		40: N _{RB,c} = 106		
BWP BW	MHz	Config 1,2		10: N _{RB,c} = 52		
		Config 3		40: N _{RB,c} =		
Initial DL BWP		Config 1, 2,	DLBW	/P.0.1		NA
Initial UL BWP		3	ULBW	/P.0.1		NA

Dedicated UL BWP Dedicated UL BWP								
Dedicated UL BWP NA	BWP configurati	Dedicated DL BWP			DLBV	/P.1.1		NA
Config 1	on	Dedicated UL			ULBV	/P.1.1	ı	NA
Config 2	TRS configu	TRS configuration		Config 1	TRS.1	.1 FDD	I	NA
Config 3				Config 2	TRS.1	.1 TDD	l	NA
A.3.2.1.1 (OP.1) COnfig 1 SR.1.1 FDD COnfig 2 SR.1.1 TDD COnfig 3 SR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 2 CR.1.1 FDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 3 CR2.1 TDD COnfig 3 CR2.1 TDD COnfig 4 CR.1.1 FDD COnfig 5 CR.1.1 TDD COnfig 6 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CR.1.1 FDD CONFIG 9 CR.1.1 FDD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1				Config 3	TRS.1	.2 TDD	1	NA
A.3.2.1.1 (OP.1) COnfig 1 SR.1.1 FDD COnfig 2 SR.1.1 TDD COnfig 3 SR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 2 CR.1.1 FDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 2 CR.1.1 FDD COnfig 3 CR2.1 TDD COnfig 3 CR2.1 TDD COnfig 3 CR2.1 TDD COnfig 4 CR.1.1 FDD COnfig 5 CR.1.1 TDD COnfig 6 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CONFIG 9 CR.1.1 FDD CR.1.1 FDD CONFIG 9 CR.1.1 FDD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1 FD CR.1.1	OCNG Patte	erns defined in		Config 1.2.3				
Config 2				3 , ,	Ol	P.1	C	P.1
Config 2 SR.1.1 TDD	PDSCH Ref	erence		Config 1	SR.1.	1 FDD		-
Config 3 SR2.1 TDD Config 3 CR.1.1 FDD Config 2 CR.1.1 FDD Config 2 CR.1.1 TDD Config 3 CR.1.1 FDD Config 3 CR.1.1 TDD Config 3 CR.1.1 TDD Config 3 CR.1.1 TDD Config 3 CR.1.1 TDD Config 3 CR2.1 TDD Config 4 SMTC.2 SMTC.5 SMTC.4 Config 1 SMTC.2 SMTC.4 SMTC.4 SMTC.4 Config 1.2 SMTC.4 Config 3 30 SEPRE ratio of PS to SSS EPRE ratio of PS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS COnfig 1,2,3 0 0 0 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2,3 Config 1,2 Config 1,2 Config 1,2 Config 3 SSS Config 3 SSS SSS Config 3 SSS SSS SSS Config 3 SSS SSS Config 3 SSS SSS Config 3 SSS SSS SSS Config 3 SSS SSS SSS Config 3 SSS SSS SSS Config 3 SSS SSS SSS Config 3 SSS SSS SSS SSS Config 3 SSS SSS SSS SSS COnfig 3 SSS SSS SSS SSS SSS COnfig 3 SSS	measureme	nt channel			SR.1.	1 TDD		
Config 1				•				
Config 2	CORESET F	Reference						-
Config 3 CR2.1 TDD	Channel			Config 2				
Config 1				Config 3	CR2.	1 TDD		
PDSCH/PDCCH subcarrier Spacing	SMTC config in A.3.11	guration defined		Config 1	SM	ΓC.2	SM	ITC.5
Config 3 30				Config 2, 3	SM	ΓC.1	SMTC.4	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH to PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG DMRS (Note 1) N oc	PDSCH/PD0	CCH subcarrier	kHz	Config 1,2			15	
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) Pocal dBm/15 KHz Nocal dBm/S CS SS-RSRP Note 3 dBm/S CS CS Config 1,2 -98 -98 -98 -98 SS-RSRP Note 3 dBm/S Config 3 -95 -95 SS-RSRP Note 3 dBm/S Config 3 -91 -91 -Infinity -91 -In	spacing			Config 3			30	
to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS (Note 1) EPRE ratio of PDSCH to PDSCH bord to PDSCH to PDSCH to PDSCH across to SSS(Note 1) FPRE ratio of OCNIG to OCNIG bord to OCNIG DMRS (Note 1) EPRE ratio of OCNIG bord to OCNIG DMRS to SSS(Note 1) Config 1,2 -98 -98 EPRE ratio of OCNIG to OCNIG bord to OCNIG DMRS (Note 1) Config 1,2 -98 -98 EPRE ratio of OCNIG to OCNIG bord to OCNIG DMRS (Note 1) Config 1,2 -98 -98 SS-RSRP Note2 dBm/S Config 1,2 -94 -94 -1nfinity -91 SS-RSRP Note3 dBm/S Config 3 -91 -91 -1nfinity -91 €x/I_a dB Config 3 -91 -91 -Infinity 7 1c,3/N_ac dB Config 1,2,3 4 4 -Infinity 7 1colorida dBm/38 Config 1,2 -64.59 -64.59 -70.05 -62.26 dBm/38 16MHz Config 3 -5	EPRE ratio	of PSS to SSS						
EPRE ratio of PBCH to PBCH DMRS Config 1,2,3 0 0 EPRE ratio of PDCCH DMRS to SSS Config 1,2,3 0 0 EPRE ratio of PDSCH DMRS to SSS Config 1,2,3 0 0 EPRE ratio of PDSCH to PDSCH to PDSCH Config 1,2,3 0 0 EPRE ratio of OCNG DMRS to SSS(Note 1) Config 1,2 -98 -98 EPRE ratio of OCNG to OCNG DMRS (Note 1) Config 1,2 -98 -98 Config 3 -95 -95 -95 SS-RSRP Note 3 dBm/S Config 1,2 -94 -94 -Infinity -91 Ê,/I _M dB Config 3 -91 -91 -Infinity 7 Ê,/N _{oc} dB Config 1,2,3 4 4 -Infinity 7 IoNote3 dBm/S Config 1,2,3 4 4 -Infinity 7 dBm/S Config 1,2,3 -64.59 -64.59 -70.05 -62.26 dBm/S Config 3 -58.49 -64.59 -64.59 -64.59 -64.59 -64.		of PBCH DMRS						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		of PBCH to PBCH						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of to SSS	of PDCCH DMRS						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio	of PDCCH to						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDCCH DM	RS		Config 1,2,3	()		0
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS							
$ \begin{array}{ c c c c c c c c c } \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note 1) \\ \hline EPRE \ ratio \ of \ OCNG \ to \\ OCNG \ DMRS \ (Note 1) \\ \hline N_{oc}^{\ \ Note2} & dBm/15 \\ N_{oc}^{\ \ Note2} & dBm/15 \\ N_{oc}^{\ \ Note2} & dBm/S \\ \hline CS & Config 1,2 \\ CS & Config 3 \\ \hline SS-RSRP^{\ \ Note 3} & dBm/S \\ \hline CS & Config 1,2 \\ \hline CS & Config 3 \\ \hline CS & Config 3 \\ \hline COnfig 3 & -91 \\ \hline CS & Config 3 \\ \hline COnfig 3 & -91 \\ \hline CS & Config 3 \\ \hline COnfig 3 & -91 \\ \hline CS & Config 3 \\ \hline COnfig 3 & -91 \\ \hline CS & Config 4 \\ \hline COnfig 1,2,3,4,5,6 \\ \hline COnfig 1,2,4,5,6 \\ \hline COnfig 1,2,4,5,6 \\ \hline COnfig 1,2,4,5,6 \\ \hline COnfi$		of PDSCH to						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		4 OCNO DMDC						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N oc Note2	, , ,			-98		-	-98
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	N Note2			Config 1,2	-(98	-	-98
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-RSRP No	te 3		Config 1,2	-94	-94	-Infinity	-91
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-91	-91		-88
36MHz	$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$					4	-	7
36MHz	\hat{E}_s/N_{oc}		dB		4	4	-Infinity	7
dBm/38	Io ^{Note3}			Config 1,2	-64.59	-64.59	-70.05	-62.26
			dBm/38	Config 3	-58.49	-58.49	-63.94	-56.15
	Propagation	Condition		Config 1,2,3	AW	'GN	A۱	VGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.6.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.2.1-1, A.6.6.2.2.1-2 and A.6.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1: Note 2:	· · · · · · · · · · · · · · · · · · ·					

Table A.6.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3		1,	2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		9		
SMTC-SSB parameters		Config 1	SSB.1 FR1				As specified in clause A.3.10.1
		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2 FR1			As specified in clause A.3.10.1	
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms		1	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3μs			Synchronous cells.	
T1	s	Config 1,2,3	5				
T2	S	Config 1,2,3	1.1	11	1.1	11	

Table A.6.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2	
		configuratio	T1	T2	T1	T2
		n				
NR RF Channel Number		Config 1,2,3	1			2
Duplex mode		Config 1	FDD			

		1	Config 2,3		TDD
TDD configur	ation		Config 1	Not	Applicable
1DD comigan	122 Johngaration		Config 2		DConf.1.1
			Config 3		DConf.2.1
BW _{channel} MHz			Config 1,2		N _{RB,c} = 52
DVVcnannei		IVIIIZ	Config 3		$N_{RB,c} = 32$
BWP BW		MHz	Config 1,2	10.	$\frac{N_{RB,c} = 100}{N_{RB,c} = 52}$
DVVF DVV		IVIITIZ		10.	N _{RB,c} = 52
BWP	Initial DL BWP		Config 3	DLBWP.0.1	NA NA
configuratio			Config 1, 2, 3	DLBWP.U.1	IVA
n	Initial UL BWP		Config 1, 2, 3	ULBWP.0.1	NA
	Dedicated DL BWP			DLBWP.1.1	NA
	Dedicated UL BWP			ULBWP.1.1	NA
TRS configura	ation		Config 1	TRS.1.1 FDD	NA
			Config 2	TRS.1.1 TDD	NA
			Config 3	TRS.1.2 TDD	NA
OCNG Patter	ns defined in		Config 1,2,3		
A.3.2.1.1 (OP			, , , , , , , , , , , , , , , , , , ,	OP.1	OP.1
PDSCH Refe	rence		Config 1	SR.1.1 FDD	-
measurement	t channel		Config 2	SR.1.1 TDD	
			Config 3	SR2.1 TDD	
CORESET R	oforonoo		Config 1	CR.1.1 FDD	-
Channel	ererence				- -
Channel			Config 2 Config 3	CR.1.1 TDD CR2.1 TDD	_
SMTC configu	uration defined		Corning 3	CRZ.1 1DD	
in A.3.11	dianori defined		Config 1	SMTC.2	SMTC.5
			Config 2, 3	SMTC.1	SMTC.4
	CH subcarrier	kHz	Config 1,2		15
spacing			Config 3		30
EPRE ratio of	PSS to SSS				
EPRE ratio of to SSS	PBCH DMRS				
EPRE ratio of	PBCH to PBCH				
	PDCCH DMRS				
to SSS EPRE ratio of	PDCCH to				
PDCCH DMR	S		Config 1,2,3	0	0
to SSS	PDSCH DMRS				
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of	EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N oc Note2	. ,	dBm/15 kHz	Config 1,2,3	-98	-98
N Note2		dBm/S	Config 1,2	-98	-98
· oc		CS	Config 3	-95	-95
SS-RSRP Note	3		Config 1,2	-94 -94	-Infinity -91
20 10101			Joining 1,2	-3 -1	ry -31

	dBm/S CS	Config 3	-91	-91	-Infinity	-88
$\hat{E}_{\scriptscriptstyle{\mathrm{s}}}/I_{\scriptscriptstyle{\mathrm{ot}}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	'GN	A۱	NGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.6.6.2.2.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	ms1	ms1	38.331 [2]
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.6.6.2.2.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.6.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell ha	target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	9	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	1.1	1	

Table A.6.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Par	ameter	Unit	Test	C	Cell 1		Cell 2
			configuratio n	T1	T2	T1	T2
NR RF Chan	nel Number		Config 1,2,3		1		2
Duplex mode	1		Config 1		F	DD	
			Config 2,3		Т	DD	
TDD configur	ation		Config 1		Not Ap	plicable	
			Config 2		TDDC	onf.1.1	
			Config 3		TDDC	onf.2.1	
BW _{channel}		MHz	Config 1,2		10: N _{RB,c} = 52		
			Config 3		40: N _{RB,c} = 106		
BWP BW		MHz	Config 1,2		10: N _{RB,c} = 52		
			Config 3		40: N _{RB,c} = 106		
BWP	Initial DL BWP			DLB\	VP.0.1		NA
configuratio	Initial UL BWP			ULB\	VP.0.1		NA
n	Dedicated DL BWP		Config 1, 2, 3			NA	
	Dedicated UL BWP						NA
TRS configur	ation		Config 1	TRS.1	.1 FDD		NA
			Config 2	TRS.1	.1 TDD		NA

		Config 3	TRS.1	.2 TDD	1	NΑ
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3	0	P.1	0	P.1
PDSCH Reference		Config 1	SR.1.	1 FDD		-
measurement channel		Config 2		1 TDD	1	
		Config 3		1 TDD	1	
CORESET Reference		Config 1	CR.1.	1 FDD		-
Channel		Config 2	CR.1	1 TDD		
		Config 3	CR2.	1 TDD		
SMTC configuration defined in A.3.11		Config 1	SM	TC.2	SM	TC.5
		Config 2, 3	SM	TC.1	SM	TC.4
PDSCH/PDCCH subcarrier	kHz	Config 1,2			15	
spacing		Config 3			30	
EPRE ratio of PSS to SSS						<u> </u>
EPRE ratio of PBCH DMRS						
to SSS						
EPRE ratio of PBCH to PBCH						
DMRS						
EPRE ratio of PDCCH DMRS						
to SSS						
EPRE ratio of PDCCH to		Config 1,2,3		0		0
PDCCH DMRS		Corning 1,2,3		O		U
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
N oc Note2	dBm/15 kHz		-1	98	-	98
N Note2	dBm/S	Config 1,2	-	98	-	98
	CS	Config 3	-	95	-	95
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	4	4	-Infinity	7
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.4	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AV	/GN	AV	VGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.6.1-1, A.6.6.2.6.1-2 and A.6.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

Config		Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies is used.
Number							useu.
Active cell		Config 1,2,3	NR ce	ll 1 (Pce	ell)		NR Cell 1 is on NR RF channel
N		0 " 100	NID				number 1.
Neighbour cell		Config 1,2,3	NR ce	112			NR cell 2 is on NR RF channel
0.00		0 " 100					number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap		Config 1,2,3	39		9		
offset							
SMTC-SSB parameters		Config 1	SSB.1 FR1				As specified in clause A.3.10.1
		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3
		-	.1	.2	.1	.2	
Time offset between		Config 1	3 ms				Asynchronous cells.
serving and neighbour						The timing of Cell 2 is 3ms later	
cells							than the timing of Cell 1.
		Config 2,3	3 μs			Synchronous cells.	
T1	S	Config 1,2,3	5				
T2	s	Config 1,2,3	1.3	13.5	1.3	13.5	

Table A.6.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Ce	II 1	Cell 2		
			configuratio	T1	T2	T1	T2	
			n					
NR RF Char	nnel Number		Config 1,2,3	•	1		2	
Duplex mode	Э		Config 1			FDD		
			Config 2,3		-	TDD		
TDD configu	ration		Config 1		Not A	pplicable		
			Config 2		TDDConf.1.1			
			Config 3		TDDConf.2.1			
BW _{channel}		MHz	Config 1,2		10: N _{RB,c} = 52			
			Config 3		40: N _{RB,c} = 106			
BWP BW		MHz	Config 1,2		10: N _{RB,c} = 52			
			Config 3		40: N	_{RB,c} = 106		
BWP	Initial DL BWP			DLBW	/P.0.1		NA	
configurati	Initial UL BWP			ULBWP.0.1 NA DLBWP.1.1 NA		NA		
on	Dedicated DL		Config 1, 2,			NA		
	BWP		3					
	Dedicated UL BWP			ULBW	/P.1.1		NA	

TRS configuration		Config 1	TRS.1	.1 FDD		NA	
Trie comigaration		Config 2		.1 TDD		NA	
		Config 3		.2 TDD		NA	
OCNG Patterns defined in		Config 1,2,3	11(0.11	.2 100		1471	
A.3.2.1.1 (OP.1)		Oomig 1,2,5	OF	P.1	C	DP.1	
PDSCH Reference		Config 1	SR.1.	1 FDD		-	
measurement channel		Config 2	SR.1.	1 TDD	Ī		
		Config 3	SR2.1	1 TDD			
CORESET Reference		Config 1		1 FDD		-	
Channel		Config 2		1 TDD	†		
		Config 3		1 TDD	†		
SMTC configuration defined							
in A.3.11	ļ	Config 1	SM	TC.2	SN	/ITC.5	
		Config 2, 3	SM	TC.1	SN	MTC.4	
PDSCH/PDCCH subcarrier	kHz	Config 1,2			15		
spacing		Config 3			30		
EPRE ratio of PSS to SSS		3 -					
EPRE ratio of PBCH DMRS							
to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to		0 " 100		•		•	
PDCCH DMRS		Config 1,2,3	(0		0	
EPRE ratio of PDSCH DMRS							
to SSS							
EPRE ratio of PDSCH to							
PDSCH							
EPRE ratio of OCNG DMRS							
to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
N_{oc}^{Note2}	dBm/15		-9	98		-98	
	kHz						
N_{oc} Note2	dBm/S	Config 1,2	-9	98		-98	
	CS	Config 3	-6	95		-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91	
	CS	Config 3	-91	-91	-Infinity	-88	
$\hat{E}_{_{s}}/I_{_{ot}}$	dB	Config 1,2,3	4	4	-Infinity	7	
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7	
Io ^{Note3}	dDm/0	Confir 1.2	64.50	64.50	70.05	60.06	
10.1360	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26	
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3	AW	/GN	A\	WGN	
paganon obnamon	1		, , , , ,		1 ,,		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

A.6.6.3 Inter-RAT Measurements

A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		1	1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables	
		A.6.6.3.1.1-2 and	
		A.6.6.3.1.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-
			UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP	Measurement quantity for Cell 2
measurement quantity			
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97	E-UTRAN RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
Hysteresis	dB	0	
TimeToTrigger	S	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	OFF
T1	S	5	
T2	S	5	
Note 1: Values are defined	in Table A.6	6.6.3.1.1-3	

Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1		
				T1	T2	
RF channel number			1, 2, 3, 4, 5, 6		1	
Duplex mode			1, 2, 3	FDD		
			4, 5, 6	-	TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1		
	SCS=30 KHz		3, 6	TDD	Conf.1.2	
BW _{channel}		MHz	1, 4	10: N _{RB,0}	c = 52 (FDD)	
			2, 5	10: N _{RB,c} = 52 (TDD)		
			3, 6	40: N _{RB,c} = 106 (TDD)		
			1, 4	SR.	1.1 FDD	

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PDSCH reference	PDSCH reference measurement		2, 5	SR.	1.1 TDD
channel			3, 6	SR.	2.1 TDD
CORSET reference	e channel		1, 4	CR.	1.1 FDD
			2, 5	CR.	1.1 TDD
			3, 6	CR.	2.1 TDD
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.0.1
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.1.1
	Initial UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.0.1
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.1.1
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6		OP.1
SMTC configuratio	n		1, 2, 3, 4, 5, 6	S	MTC.1
SSB configuration			1, 2, 4, 5	SS	B.1 FR1
			3, 6		B.2 FR1
b2-Threshold1		ID.	1, 2, 4, 5		-98
		dBm	3, 6		-95
EPRE ratio of PSS	to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBC			, , , , ,		
	H to PBCH_DMRS				
	CH_DMRS to SSS				
EPRE ratio of PDC					
PDCCH_DMRS		dB			0
EPRE ratio of PDS	EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDS					
PDSCH_DMRS					
EPRE ratio of OCN	NG DMRS to SSS				
EPRE ratio of OCN	NG to OCNG DMRS				
Noc ^{Note2}		dBm/15 KHz	1, 2, 3, 4, 5, 6	-106	
N _{oc} Note2		dBm/SCS	1, 2, 4, 5		-106
			3, 6		-103
Ê _s /N _{oc}		dB	1, 2, 3, 4, 5, 6	18	-2
Ê _s /I _{ot} Note3		dB	1, 2, 3, 4, 5, 6	18	-2
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-88	-108
			3, 6	-85	-105
SSB_RP ^{Note3}		dBm/SCS	1, 2, 4, 5	-88	-108
			3, 6	-85	-105
Io ^{Note3}		dBm/9.36 MHz	1, 2, 4, 5	-59.98	-75.92
10,1000		dBm/38.16 MHz	3, 6	-53.88	-69.82
Propagation condition			1, 2, 3, 4, 5, 6	ET	DLA30
Antenna Configuration and Correlation Matrix			1, 2, 3, 4, 5, 6	1)	<2 Low
	shall be used such tha	t both cells are fu	lly allocated and a d	constant total tr	ansmitted power
spectral	density is achieved for	or all OFDM symb	ols.		•
Note 2: Interfere	ence from other cells a ocarriers and time and	nd noise sources	not specified in the		
	Joanners and time and	Shall be modelle	a as Avvoiv of appl	opriate power i	or IV oc
fulfilled.					

Table A.6.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

purposes. They are not settable parameters themselves.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Dunley mode		1 2 3	FDI	<u> </u>

		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB} 10 MHz: N _{RI} 20 MHz: N _{RB}	3,c = 50	
PDSCH parameters: DL Reference Measurement Channel ^{Note2}		1, 2, 3	5 MHz: R.7 10 MHz: R. 20 MHz: R.	FDD 3 FDD	
		4, 5, 6	5 MHz: R.4 10 MHz: R. 20 MHz: R.	0 TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement		1, 2, 3	5 MHz: R.1 10 MHz: R.1 20 MHz: R.1	6 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.10 FDD 5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD		
		4, 5, 6	5, 6 5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD		
PBCH_RA PBCH_RB		1, 2, 3, 4, 5, 6	6		
PSS_RA					
SSS_RA PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB PDSCH_RA					
PDSCH_RB	 				
OCNG RA ^{Note3}					
OCNG RB ^{Note3}					
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-106		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
IoNote5	dBm/9MHz	1, 2, 3, 4, 5, 6	-78.22+10log (N _{RB,c} /50)	-59.16+10log (N _{RB,c} /50)	
Propagation Condition	opagation Condition 1, 2, 3, 4, 5, 6 ETU70		j ´		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low		
Correlation Matrix			-		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.6.6.3.2.1-1. General test parameters are provided in Table A.6.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.2.1-3 and A.6.6.3.2.1-4, respectively.

Table A.6.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Configuration	on Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The	UE is only required to be tested in one of the supported test configurations

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1 Test 2		Comment	
		Value			
NR RF Channel Number		1		1 NR carrier frequency is used in the test	
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test	
Channel Bandwidth	MHz	As specified	l in Tables		
		A.6.6.3.2.1-2	2 and		
		A.6.6.3.2.1-	3.		
Active cell		Cell 1		Cell 1 is on RF channel number 1	
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2	
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE	
				gap pattern.	
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1	
Inter-RAT E-UTRAN		RSRP		Measurement quantity for Cell 2	
measurement quantity					
b2-Threshold1	dBm	Note 1		SS-RSRP threshold for SS-RSRP	
				measurement on cell1 for event B2	
b2-Threshold2EUTRA	dBm	-97		E-UTRAN RSRP threshold for SS-RSRP	
				measurement on cell1 for event B2	
Hysteresis	dB	0			
TimeToTrigger	S	0			
Filter coefficient		0		L3 filtering is not used	
DRX		DRX.1	DRX.2	DRX cycle configurations DRX.1 and DRX.2	
				are defined in Table A.3.3.1-1 and Table	
				A.3.3.2-1 respectively.	
T1	S	5			
T2	S	5	15		
Note 1: Values are define	ed in Table	A.6.6.3.2.1-3			

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Parameter		Unit	Configuration		Cell 1
				T1	T2
RF channel number	RF channel number		1, 2, 3, 4, 5, 6		1
Duplex mode			1, 2, 3		FDD
			4, 5, 6		TDD
TDD Configuration	SCS=15 KHz		2, 5	TDI	Conf.1.1
	SCS=30 KHz		3, 6	TDI	Conf.2.1
BW _{channel}		MHz	1, 4	10: N _{RB}	,c = 52 (FDD)
			2, 5	10: N _{RB}	_{,c} = 52 (TDD)
			3, 6	40: N _{RB} ,	c = 106 (TDD)
PDSCH reference	measurement		1, 4	SR	.1.1 FDD
channel			2, 5		.1.1 TDD
			3, 6	SR	.2.1 TDD
CORSET reference	e channel		1, 4	CR	.1.1 FDD
			2, 5	CR	.1.1 TDD
			3, 6	CR	.2.1 TDD
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.0.1
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.1.1
	Initial UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.0.1
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.1.1
OCNG pattern ^{Note1}	OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6		OP.1
SMTC configuratio	SMTC configuration		1, 2, 3, 4, 5, 6	S	MTC.1
SSB configuration			1, 2, 4, 5	SS	B.1 FR1
			3, 6	SS	B.2 FR1
b2-Threshold1		dBm	1, 2, 4, 5		-98

		3, 6		-95
EPRE ratio of PSS to SSS		,		
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to				
PDCCH_DMRS	dB	1, 2, 3, 4, 5, 6		0
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-106	
Noc Note2	dBm/SCS	1, 2, 4, 5	-106	
1 100		3, 6		-103
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	18	-2
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	18	-2
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
	dBm/9.36	1, 2, 4, 5	-59.98	-75.92
IoNote3	MHz			
	dBm/38.16	3, 6	-53.88	-69.82
	MHz			
Propagation condition		1, 2, 3, 4, 5, 6	ETDLA30	
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x	2 Low
Matrix		U		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Ê_s/I_{ot}, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c}	= 25
			10 MHz: N _{RB} ,	c = 50
			20 MHz: N _{RB,c}	= 100
PDSCH parameters:		1, 2, 3	5 MHz: R.7	FDD
DL Reference Measurement			10 MHz: R.3	FDD
Channel ^{Note2}			20 MHz: R.6 FDD	
		4, 5, 6	5 MHz: R.4	TDD
			10 MHz: R.0	TDD
			20 MHz: R.3	TDD

PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.1	1 FDD	
parameters:		1, 2, 0	10 MHz: R.6 FDD		
DL Reference Measurement			20 MHz: R.10 FDD		
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 TDD		
Charmon		1, 0, 0	10 MHz: R.6 TDD		
			20 MHz: R.10 TDD		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.2		
CONC I allomo		1, 2, 0	10 MHz: OP.		
			20 MHz: OP.	-	
		4, 5, 6	5 MHz: OP.		
		1, 0, 0	10 MHz: OP	-	
			20 MHz: OP		
PBCH_RA					
PBCH_RB					
PSS RA					
SSS RA					
PCFICH_RB					
PHICH RA					
PHICH_RB	dB	1, 2, 3, 4, 5, 6	0		
PDCCH_RA		, , -, , -, -	•		
PDCCH_RB					
PDSCH_RA					
PDSCH RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-106		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-78.22+10log (N _{RB,c} /50)	-59.16+10log (N _{RB,c}	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	/50) ETU70		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low		
Correlation Matrix Note6					

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.4 L1-RSRP measurement for beam reporting

A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.6.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.1.1-1.

Table A.6.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description			
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations			

A.6.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.1.2-1 and Table A.6.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chamer	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD
Charlie	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Onamer	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1

OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
Dedicated BWF corniguration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		Off
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	13	uВ	O O
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			_
Propagation condition	1~3		AWGN

Table A.6.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSI	B#0	SSI	3#1
Parameter	Coming	Offic	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~3	dBm/15kHz		-94.65		
$N_{oc}^{ m Note2}$	1,2	dBm/SSB SCS	-94.65 -91.65			
1 voc	3	dbiii/33b 303				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
OOD NON	3	abilitioob ooo	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84

\hat{E}_s/N_{oc}	1~3	dB	0	0	-Infinity	3
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Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.6.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.2.1-1.

Table A.6.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Co	onfig	Description	
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: T	The UE is only required to be tested in one of the supported test configurations		

A.6.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.2.2-1 and Table A.6.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD

	1		N/A
TDD Configuration	2]	TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
DDCCII Deference management	1		SR.1.1 FDD
PDSCH Reference measurement channel	2	ĺ	SR.1.1 TDD
channel	3		SR.2.1 TDD
D1401 00DF0FF D /	1		CR.1.1 FDD
RMSI CORESET Reference	2	İ	CR.1.1 TDD
Channel	3	1	CR.2.1 TDD
	1		CCR.1.1 FDD
Dedicated CORESET Reference	2	1	CCR.1.1 TDD
Channel	3	1	CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2	}	SSB.3 FR1
33B configuration	3		SSB.4 FR1
OCNG Patterns	1~3		
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
			ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
SMTC configuration	1~3		ULBWP.1.1 SMTC.1
SW10 comiguration	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
110 Comiguration	3		TRS.1.2 TDD
DRX configuration	1~3		DRX.3
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	+		2
	1~3	olot	_
L1-RSRP reporting period	1~3 1~3	slot	80
T2	1~3	S	5 1
[1~3	S	i i
EPRE ratio of PSS to SSS	4		
EPRE ratio of PBCH DMRS to SSS	4		
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	1.5	35	
SSS	_		
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~3		AWGN
N 1 00NO 1 111 1 1 1 1	. 1 .1 11	0 11 11	

SSB#1 **Parameter** Config Unit **T1 T2 T1 T2** N_{oc} Note2 1~3 dBm/15kHz -94.65 1,2 -94.65 dBm/SSB SCS 3 -91.65 $\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$ 1~3 dB 0 0 -Infinity 3 1,2 -94.65 -94.65 -Infinity -91.65 SSB RSRP Note3 dBm/SSB SCS 3 -91.65 -91.65 -Infinity -88.65 dBm/9.36 MHz 1,2 -63.69 -63.69-66.70-61.93 In Note3 3 dBm/38.16 MHz -57.59 -57.59 -60.61 -55.84 \hat{E}_{s}/N_{oc} 1~3 dΒ 0 0 -Infinity 3

Table A.6.6.4.2.2-2: SSB specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.6.6.4A.6.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.3.1-1.

Table A.6.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only	ote: The UE is only required to be tested in one of the supported test configurations		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

A.6.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.3.2-1 and Table A.6.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chamer	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Charmer	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD

Initial BWP Configuration	1~3		DLBWP.0.1
Thillar BWT Corniguration	11-0		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
	. 0		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		Off
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0
qci-11110	1~3		SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	26
T1	1~3	s	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS			
Propagation condition	1~3		AWGN
1 Topagation condition	11-0		/(00014

Table A.6.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
$N_{oc}^{ m Note1}$	1~3	dBm/15kHz	-94	.65
N Note1	1,2	dBm/SSB SCS	-94.65	
$N_{oc}^{ m Note1}$	3	UBII/33B 3C3	-91	.65
\hat{E}_{s}/I_{ot}	1~3	dB	0	3
CSI-RS RSRP	1,2	- dBm/SSB SCS	-94.65	-91.65
Note2	3	dbiii/33b 3c3	-91.65	-88.65
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93
10	3	dBm/38.16 MHz	-57.59	-55.84

\hat{E}_s/N_{oc}		1~3	dB	0	3
Note 2:	Interfer	ence from other c	ells and noise sources no	t specified in the test i	s assumed to be
I			المسام والمسام المسام المسائد المسام	I - I	

constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.4.1-1.

Table A.6.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is on	ly required to be tested in one of the supported test configurations

A.6.6.4.4.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.4.2-1 and Table A.6.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (1 Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD

	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Charine	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Channel	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1
Initial BWF Configuration	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
Dedicated BWF configuration			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0 SSB#1 for resource#1
			GGD#11011e30u1Ce#1

reportSlotOffsetList	1~3	slots	26
T1	1~3	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
37 4 0 637 6 1 111 1 1 1 1		0 11 11	

Table A.6.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1			
$N_{oc}^{ m Note1}$	1~3	dBm/15kHz	-94.65				
λ / Note1	1,2	dBm/SSB SCS	-94	.65			
$N_{oc}^{ m Note1}$	3	UBIII/33B 3C3	-91	.65			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	3			
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65			
Note2	3	UDII//33B 3C3	-91.65	-88.65			
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93			
10	3	dBm/38.16 MHz	-57.59	-55.84			
\hat{E}_s/N_{oc}	1~3	dB	0	3			

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.6.6.3.3.

A.6.7 Measurement Performance requirements

A.6.7.1 SS-RSRP

A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
Paran	letei	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID	IID			0	489	0	489	0
SSB ARFCN			fre	q1	fre	q1	fre	q1
Duplex mode	Config 1				FD	D		
Duplex mode	Config 2,3				TE	D		
TDD configuration	Config 1				Not App	olicable		
	Config 2				TDDC	onf.1.1		
	Config 3		TDDConf.2.1					
	Config 1				10: N _{RE}	3,c = 52		
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52					
	Config 3		40: N _{RB,c} = 106					
	Config 1		10: N _{RB,c} = 52					
BWP BW	Config 2			•	10: N _{RE}	s,c = 52	•	
	Config 3		40: N _{RB,c} = 106					

Downlink initial BWP cor				DLBW	/P.0.1			
Downlink dedicated BWI		DLBWP.1.1						
Uplink initial BWP config			ULBWP.0.1					
Uplink dedicated BWP c				ULBW	/P.1.1			
TRS configuration	Config 1		TRS.1. 1 FDD	NA	TRS.1 .1 FDD	NA	TRS.1. 1 FDD	NA
	Config 2		TRS.1. 1 TDD	NA	TRS.1 .1 TDD	NA	TRS.1. 1 TDD	NA
	Config 3		TRS.1. 2 TDD	NA	TRS.1 .2 TDD	NA	TRS.1. 2 TDD	NA
DRX Cycle		ms			Not App	olicable		
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-
Reference Channel	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Control channel RMC	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
	Config 1		SSB 1 FR1		SSB 1 FR1		SSB 1 FR1	
SSB configuration	Config 2		SSB 1 FR1	-	SSB 1 FR1	-	SSB 1 FR1	-
	Config 3		SSB 2 FR1		SSB 2 FR1		SSB 2 FR1	
	Config 1		SSB.1 FR1	FR1	FR1	FR1	FR1	FR1
SSB configuration	Config 2		SSB.1 FR1	FR1	FR1	FR1	FR1	FR1
	Config 3		SSB.2 FR1	SR.1.1 SR.1.1 SR.2.1 SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 TDD SR.2.1 SR.2.1 TDD SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.1 SR.2.2				
Time offset with Cell 2	Config 1	ms	-		-		-	
THIC CHOCK WITH OCH Z	Config 2,3	μs	-	3		l .	-	3
SMTC configuration	Config 1							
	Config 2,3							
OCNG Patterns								
PDSCH/PDCCH	Config 1,2	kHz				kHz		
subcarrier spacing	Config 3				30k	κHz		

EPRE ratio	of PSS to SS	SS																															
	of PBCH DM																																
	of PBCH to F																																
EPRE ratio	of PDCCH D	MRS to SSS																															
		PDCCH DMRS	dB	0	0	0	0	0	0																								
	of PDSCH D		uБ	U	0	U	0	0	U																								
	of PDSCH to																																
		/IRS to SSS(Note 1)																															
	of OCNG to	OCNG DMRS (Note																															
1)		NR_FDD_FR1_A,																															
		NR_TDD_FR1_A																															
		NOTE 6						-1	14																								
		NR_FDD_FR1_B						-11	3.5																								
		NR_TDD_FR1_C						-1	13																								
	Config 1,2	NR_FDD_FR1_D,		-10	06	-8	38																										
		NR_TDD_FR1_D						-11	2.5																								
		NR_FDD_FR1_E,						4	10																								
		NR_TDD_FR1_E NR_FDD_FR1_G						-1	12																								
Note2		NR_FDD_FR1_H	dBm/15Kh						0.5																								
N_{oc}^{Note2}		NR_FDD_FR1_A,	Z					'''	0.0																								
		NR_TDD_FR1_A																															
		NOTE 6						-114																									
	Config 3	NR_FDD_FR1_B						-113.5																									
		NR_TDD_FR1_C		Not				-113																									
		NR_FDD_FR1_D,		applical	applicableNote 5		-94		٥.																								
		NR_TDD_FR1_D NR_FDD_FR1_E,						-11	2.5																								
		NR_TDD_FR1_E						-112																									
		NR_FDD_FR1_G						-111																									
		NR_FDD_FR1_H						-110.5																									
	Config 1,2		-106		-88		Same as Noc/15kHz																										
	<u> </u>	NR_FDD_FR1_A,		100				-1																									
		NR_TDD_FR1_A						-1	11																								
		NOTE 6																															
		NR_FDD_FR1_B						-11	0.5																								
$N_{oc}^{\rm Note2}$		NR_TDD_FR1_C	dBm/SCS	NI.	ot			-110																									
	Config 3	NR_FDD_FR1_D,		Not applicable ^{Note 5}		-6	91	-10	9.5																								
		NR_TDD_FR1_D		арриоа	DIO .																												
		NR_FDD_FR1_E,						-1	09																								
		NR_TDD_FR1_E NR_FDD_FR1_G	-																													-1	08
		NR_FDD_FR1_H							7.5																								
Ĉ/I	<u> </u>	1	40	0.40	F 07	0.40	F 07	-0.01	-4.76																								
\hat{E}/I_{ot}			dB	2.46	-5.97	2.46	-5.97																										
$\hat{\mathcal{E}}_{s}/N_{\!\scriptscriptstyle oc}$		dB	6	1	6	1	3	0																									
		NR_FDD_FR1_A,						-	-																								
		NR_TDD_FR1_A						111.00	114.00																								
		NOTE 6																															
		NR_FDD_FR1_B						-	- 440.50																								
SS-	Confic 4.0		4D~~/CCC	400	405	00	07	110.50	113.50																								
RSRP ^{Not} e3	Config 1,2	NR_TDD_FR1_C	dBm/SCS	-100	-105	-82	-87	110.00	113.00																								
		NR_FDD_FR1_D,						100.50	112.50																								
	1	NR_TDD_FR1_D NR_FDD_FR1_E,	<u> </u>					109.50	112.50																								
		NR_TDD_FR1_E,						109.00	112.00																								
		'*'_ DD_ \ _L		L	<u> </u>		l	100.00	112.00																								

NP EDD EP1 H	- 111.00		
NR_FDD_FR1_H - 107.50 1			
	- 110.50		
NR_FDD_FR1_A, -	- 111.00		
NR_FDD_FR1_B - 107.50 1	- 110.50		
NR_TDD_FR1_C	- 110.00		
	- 109.50		
NR_FDD_FR1_E, NR_TDD_FR1_E - 106.00 1	109.00		
NR_FDD_FR1_G 105.00 1	- 108.00		
	- 107.50		
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 -80.0	3		
NR_FDD_FR1_B -79.5	3		
NR_TDD_FR1_C -79.0	3		
Config 1,2	3		
NR_FDD_FR1_E, NR_TDD_FR1_E -78.0	3		
NR_FDD_FR1_G -77.0	3		
Io ^{Note3} NR_FDD_FR1_H -76.5	3		
NR_FDD_FR1_A, -73.9 NR_TDD_FR1_A NOTE 6	4		
NR_FDD_FR1_B -73.4	4		
NR_TDD_FR1_C dBm/ Not -72.9	4		
CONTIG 3 NR_FDD_FR1_D, 39 16MHz applicable Note 5_ -51.99 -72.4	4		
NR_TDD_FR1_D 30:10WH2 applicable -	<u></u>		
NR_TDD_FR1_E	7		
NR_FDD_FR1_G -70.9	4		
NR_FDD_FR1_H -70.4	4		
Propagation condition - AWGN			
Antenna configuration 1x2			

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only red	quired to be tested in one of the supported test configurations in each supported band

A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Davamatar	Confin	l lmi4	Test 1		Test 2	
Parameter	Connig	Unit	Cell 1	Cell 1 Cell 2		Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
	1		10: N _{RB,c} =	= 52	10: N _{RB,c} = 52	
BW _{channel}	2	MHz	10: N _{RB,c} =	= 52	10: N _{RB,0}	= 52
	3		40: N _{RB,c} =	: 106	40: N _{RB,c}	= 106
	1		FDD		FDE)
Duplex mode	2		TDD		TDE)
	3		TDD		TDE)
	1		N/A		N/A	١
TDD configuration	2		TDDConf	.1.1	TDDConf.1.1	
	3		TDDConf	.2.1	TDDCor	nf.2.1
PDSCH Reference	1		SR.1.1 FDD		SR.1.1 FDD	
measurement channel	2		SR.1.1 TDD	-	SR.1.1 TDD	-
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET Reference	1		CR.1.1 FDD	-	CR.1.1 FDD	-
Channel	2		CR.1.1 TDD	-	CR.1.1 TDD	-
Chamer	Config Unit Cell 1 Cell 2 Cell 1 d>	-				
Dedicated CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel			CCR.1.1 TDD	-	CCR.1.1 TDD	-
Reference Charmer	Config	-				
	1		SSB.1 F	R1	SSB.1	FR1
SSB configuration			SSB.1 F	R1	SSB.1	FR1
	3		SSB.2 F	R1	SSB.2	FR1
OCNG Patterns	1~3		OP.1			1
TRS configuration	1		TRS.1.1 FDD	-	_	

		2		TRS.1.1 TDD		TRS.1.1	
		3		TRS.1.2 TDD		TDD TRS.1.2 TDD	
Initial BWP	Configuration	1~3		DLBWP.0.1		DLBWP.0.1	
	BWP configuration	1~3		ULBWP.0 DLBWP.		ULBWP.0.1 DLBWP.1.1	
SMTC conf		1~3		ULBWP.		ULBWF SMT(
	between Cell 1	1~3	Ша	3	1	3	. I
and Cell 2 EPRE ratio of	of PSS to SSS	1~3	μs	3		3	
	of PBCH DMRS to						
	of PBCH to PBCH						
	of PDCCH DMRS to						
	of PDCCH to PDCCH	1~3	dB	0	0	0	0
	of PDSCH DMRS to			, and the second			Ü
	of PDSCH to PDSCH						
	of OCNG DMRS to						
	of OCNG to OCNG						
	NR_FDD_FR1_A, NR_TDD_FR1_A						-115
	NR_FDD_FR1_B	1~3	dBm/15	-94.65		(N_{oc} for	-114.5
N_{oc} Note2	NR_TDD_FR1_C NR_FDD_FR1_D,						-114 -113.5
	NR_TDD_FR1_D NR_FDD_FR1_E,		kHz		1.65	Channel 2 +8dB)	-113
	NR_TDD_FR1_E NR_FDD_FR1_G						-112
	NR_FDD_FR1_H NR_FDD_FR1_A,						-111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5						-115
	NR_FDD_FR1_B					λ 7	-114.5
	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5		-94.65		$(N_{oc} \text{ for } Channel 2)$	-114 -113.5
	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E					+8dB)	-113
. Note2	NR_FDD_FR1_G		ID (00				-112
N_{oc}	NR_FDD_FR1_H NR_FDD_FR1_A,		dBm/SS B SCS				-111.5 -112.00
	NR_TDD_FR1_A						440.50
	NR_FDD_FR1_B NR_TDD_FR1_C					$(N_{oc})_{for}$	-112.50 -112.00
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		-91.65		Channel 2 +8dB)	-111.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					+oub)	-111.00
	NR_FDD_FR1_G NR_FDD_FR1_H						-110.00 -110.50
	\hat{E}_s/I_{ot}	1~3	dB	10	10	13	-3
SS- RSRP ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A	1,2,4,5	dBm/SC	-84.65			
KOKPIIII	NOTE 5		S				-118.00

	1	T	T	ı		1	
	NR_FDD_FR1_B						-117.50
	NR_TDD_FR1_C						-117.00
	NR_FDD_FR1_D,					(RSRP for	440.50
	NR_TDD_FR1_D					Cell 2	-116.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					+25dB)	-116.00
	NR FDD FR1 G						-115.00
	NR_FDD_FR1_H						-114.50
	NR_FDD_FR1_A,						-115.00
	NR_TDD_FR1_A						-115.00
	NOTE 5						
	NR_FDD_FR1_B						-114.50
	NR_TDD_FR1_C				(RSRP for	-114.00	
	NR_FDD_FR1_D,	3		-81.65		Cell 2	-113.50
	NR_TDD_FR1_D				+25dB)	+25dB)	
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113.00
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
	NR_FDD_FR1_A,						-85.28
	NR TDD FR1 A						-03.20
	NOTE 5	1,2,4,5					
	NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C		dBm/	dBm/		Io for Channel 2	-84.28
	NR_FDD_FR1_D,		1,2,4,5	9.36MH	-56.28		-83.78
	NR_TDD_FR1_D		Z			+19.75dB) T	00.00
	NR_FDD_FR1_E, NR_TDD_FR1_E						-83.28
	NR_FDD_FR1_G						-82.28
	NR FDD FR1 H						-81.78
Io ^{Note3}	NR_FDD_FR1_A,						-79.19
	NR_TDD_FR1_A						75.15
	NOTE 5						
	NR_FDD_FR1_B						-78.69
	NR_TDD_FR1_C	_	dBm/			Io for	-78.19
	NR_FDD_FR1_D,	3	38.16M	-50.19		Channel 2	-77.69
	NR_TDD_FR1_D NR_FDD_FR1_E,		Hz			+19.75dB)T	77.40
	NR_FDD_FR1_E,						-77.19
	NR FDD FR1 G						-76.19
	NR FDD FR1 H						-75.69
		4.5	15	4.0	4.5	4.0	
	\hat{E}_s/N_{oc}	1~3	dB	10	10	13	-3
Propag	gation condition	1~3	-	AWGN		AWG	SN
Antenn	a configuration	1~3		1x2		1x2	!

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for $N_{\it oc}$ to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

A.6.7.1.3 Void

A.6.7.2 SS-RSRQ

A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Damana	-4	l lmit	Tes	st 1	Test 2		Test 3	
Parame	eter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			fre	q1	fre	q1	fre	q1
Duplex mode	Config 1				FD			
Bapiex mode	Config 2,3				TD	D		
	Config 1				Not App	licable		
TDD configuration	Config 2				TDDCo	nf.1.1		
	Config 3				TDDCo	nf.2.1		
	Config 1	10: N _{RB,c} = 52						
BW _{channel}	Config 2	MHz			10: N _{RB} ,	c = 52		
	Config 3		40: N _{RB,c} = 106					
Gap Pattern ID					0			
	Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP				DLBW	P.1.1		
BWP configuration	Initial UL BWP				ULBW	P.0.1		
	Dedicated UL BWP				ULBW	P.1.1		
DRX Cycle		ms			Not App	licable		
PDSCH Reference	Config 1		SR.1.1 FDD	_	SR.1.1 FDD	_	SR.1. 1 FDD	
measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1. 1 TDD	-

		Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
		Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1. 1 FDD	
RMSI COR Reference		Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1. 1 TDD	
		Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2. 1 TDD	
	Config 1			CCR.1. 1 FDD		CCR.1. 1 FDD		CCR. 1.1 FDD	
Control Ch	Control Channel RMC Config 2			CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR. 1.1 TDD	-
		Config 3		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR. 2.1 TDD	
OCNG Pat	terns			OP. 1					
SS-RSSI-M	/leasurement					Not Applicable			
SMTC conf	figuration					SMT	SMTC.1		
000		Config 1,2				SSB.1 FR1			
SSB config	juration	Config 3				SSB.2	FR1		
PDSCH/PD	OCCH	Config 1,2				15 k	Hz		
subcarrier		Config 3	kHz			30kl			
EPRE ratio	of PSS to SS	SS				1			
EPRE ratio	of PBCH DM	RS to SSS							
	of PBCH to F								
EPRE ratio	of PDCCH to	MRS to SSS PDCCH DMRS							
	of PDSCH D		dB	0	0	0	0	0	0
	of PDSCH to								
EPRE ratio	of OCNG DN	IRS to SSS(Note 1)							
	of OCNG to	OCNG DMRS (Note							
1)		NR_FDD_FR1_A, NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B						11	3.5
		NR_TDD_FR1_C							13
	Config 1,2	NR_FDD_FR1_D,		-8	5	-10	01		2.5
		NR_TDD_FR1_D							2.0
	NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H							-1	12
Note2			dBm/15kH						11
1 v oc			z					-11	0.5
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-1	14
		NR_FDD_FR1_B							3.5
	Config 3	NR_TDD_FR1_C NR_FDD_FR1_D,		-91		-			13
		NR_TDD_FR1_D,						-11	2.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12

		NR_FDD_FR1_G						-1	11
		NR_FDD_FR1_H						-11	0.5
		NR_FDD_FR1_A,							
		NR_TDD_FR1_A						1	1.1
		NR_FDD_FR1_B						-114 -113.5	
		NR_TDD_FR1_C						-113	
	Config 1,2	NR_FDD_FR1_D,		-8	35	-101			2.5
	J ,	NR_TDD_FR1_D						-1	12
		NR_FDD_FR1_E,						-1	
		NR_TDD_FR1_E						-11	0.5
		NR_FDD_FR1_G							
N oc Note2		NR_FDD_FR1_H NR_FDD_FR1_A,	dBm/SCS						
		NR_TDD_FR1_A						-1	11
		NOTE 6		-88					^ -
		NR_FDD_FR1_B NR_TDD_FR1_C							0.5 10
	Config 3	NR_FDD_FR1_D,					_		
	Corming C	NR_TDD_FR1_D						-10	9.5
		NR_FDD_FR1_E,							09
		NR_TDD_FR1_E		-1.76					
		NR_FDD_FR1_G						-108 -107.5	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		NR_FDD_FR1_H	dB			-4.7		-546	7.5 -5.46
\hat{E}_s/N_{oc}			dB	3	3	-2.9	-2.9	-340	-3.40
L _s /1V _{oc}		NR_FDD_FR1_A,	αВ	3	3	-2.3	-2.3		-4
	Config 1,2	NR_TDD_FR1_A						-118	-118
		NOTE 6							
		NR_FDD_FR1_B						-117.5	-117.5
		NR_TDD_FR1_C		-82	-82	-103.9		-117	-117
		NR_FDD_FR1_D,					-103.9	-116.5	-116.5
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-116	-116
		NR_FDD_FR1_G						-115	-115
SS- RSRP ^{Note}		NR_FDD_FR1_H	dBm/SCS					-114.5	-114.5
3		NR_FDD_FR1_A,	ubiii/3C3						
		NR_TDD_FR1_A						-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
		NR TDD FR1 C						-114	-114
	Config 3	NR_FDD_FR1_D,		-85	-85	-	-		
		NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E,						-113	-113
		NR_TDD_FR1_E			1		1		
		NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5	-112 -111.5
	1	NR_FDD_FR1_A,						111.5	
		NR_TDD_FR1_A							
		NOTE 6							
		NR_FDD_FR1_B			1		1		
SS-DSDO	SS-RSRQ Note3	NR_TDD_FR1_C NR_FDD_FR1_D,	dB	-14.77	-14.77	-16 76	-16.76	-17.34	-17.34
JJ-NJRQ		NR_TDD_FR1_D,	uБ	-14.//	-14.77	-16.76	-10.76	-17.34	-17.34
		NR_FDD_FR1_E,			1		1		
		NR_TDD_FR1_E			1		1		
		NR_FDD_FR1_G			1		1		
		NR_FDD_FR1_H			I		I	I	

		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-80	3.5
		NR_FDD_FR1_B						-8	3
		NR_TDD_FR1_C						-82	2.5
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-5	60	-7	0	-8	32
		NR_FDD_FR1_E, NR_TDD_FR1_E						-8′	1.5
		NR_FDD_FR1_G						-80).5
Io ^{Note3}		NR_FDD_FR1_H						-80	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-77	7.4
		NR_FDD_FR1_B						-76.9	
	0 " 0	NR_TDD_FR1_C	dBm/	_				-76	6.4
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D	38.16MHz	-5	00	-	•	-75	5.9
		NR_FDD_FR1_E, NR_TDD_FR1_E						-75	5.4
		NR_FDD_FR1_G						-74	1.4
		NR_FDD_FR1_H						-73	3.9
Propagatio	Propagation condition		-	AWGN	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna co	nfiguration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.2.2.2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Те	st 1	Tes	st 2	Tes	st 3
		Offic	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Config 1		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1 Config 2,3	=			TD			
	Config 1				Not App			
TDD configuration	Config 2				TDDC			
	Config 3				TDDC	onf.2.1		
	Config 1				10: N _{RE}	s,c = 52		
BW _{channel}	Config 2	MHz			10: N _{RE}	B,c = 52		
	Config 3				40: N _{RB} ,	c = 106		
Gap pattern ID	Config 1,2,3				C)		
	Config 1				10: N _{RE}	$_{3,c} = 52$		
BWP BW	Config 2				10: N _{RE}	s,c = 52		
	Config 3		40: NRB,c = 106					
DRX Cycle		ms			Not App	olicable		
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	_	SR.1.1 TDD	_
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD	
OCNG Patterns	-			•	OCNG p	attern 1	-	•
SMTC configuration	Config 1,2		SMTC pattern 1					
SW10 comiguration	Config 3		SMTC pattern 2					
SSB configuration	Config 1,2				SSB patter			
COD Connigulation	Config 3			;	SSB patter		1	
	Config 1,2	kHz			15 k	kHz		

PDSCH/PD	DCCH	Config 3		30 kHz							
subcarrier		3 -				30 k	HZ				
EPRE ratio	of PSS to SSS										
EPRE ratio	of PBCH DMRS	to SSS									
EPRE ratio	of PBCH to PBC	H DMRS									
EPRE ratio	of PDCCH DMR	S to SSS									
	of PDCCH to PD		dB	0	0	0	0	0	0		
EPRE ratio	of PDSCH DMR	S to SSS									
	of PDSCH to PD										
	of OCNG DMRS										
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1)									
		NR_FDD_FR1_A									
		NR_TDD_FR1_A									
		NOTE 6						-11	6		
		NR_FDD_FR1_B						-11	5.5		
3.7		NR_TDD_FR1_C				-11	5				
N_{oc}	Config 1,2	NR_FDD_FR1_D	dBm/15kHz	-80).18	-10	26				
Note2		NR_TDD_FR1_D	GB.11// TOTAL 12		•		-114	1.5			
		NR FDD FR1 E							1.0		
		NR_TDD_FR1_E						11	4		
								-11			
		NR_FDD_FR1_G						-11			
		NR_FDD_FR1_H						-112	2.5		
		NR_FDD_FR1_A									
		NR_TDD_FR1_A									
								-11			
		NR_FDD_FR1_B				-113		-11			
N_{oc}		NR_TDD_FR1_C						-11	5		
Note2	Config 3	NR_FDD_FR1_D	dBm/15kHz	-86.27							
Notez		NR_TDD_FR1_D				-114	4.5				
		NR_FDD_FR1_E									
		NR TDD FR1 E					-114		4		
		NR_FDD_FR1_G						-113			
		NR FDD FR1 H						-113			
		NR_FDD_FR1_A						- 1 12	2.0		
		. – – –									
		NR_TDD_FR1_A						4.4			
								-11			
		NR_FDD_FR1_B						-115.5			
		NR_TDD_FR1_C					_	-11	5		
	Config 1,2	NR_FDD_FR1_D		-80).18	-10	06				
		NR_TDD_FR1_D						-114	4.5		
		NR_FDD_FR1_E									
		NR_TDD_FR1_E						-11	4		
		NR_FDD_FR1_G						-11	3		
N_{oc}		NR_FDD_FR1_H	-ID /4 EL-L-					-112	2.5		
Note2		NR_FDD_FR1_A	dBm/15kHz								
		NR_TDD_FR1_A									
		NOTE 6						-11	3		
		NR_FDD_FR1_B						-112			
		NR_TDD_FR1_C						-11			
	Config 3	NR_FDD_FR1_D		_01	3.27	-1	10	''	-		
	Coming 3	NR_TDD_FR1_D		-03	J. Z I	-'	10	444	1.5		
								-11 ²	1.0		
	NR_FDD_FR1_E								.		
		NR_TDD_FR1_E						-11			
	NR_FDD_FR1_G							-11			
		NR_FDD_FR1_H						-109	9.5		
\hat{E}_{s}/I_{ot}			dB	-1	.75	-1.	75	3	-1.75		
\hat{E}_{s}/N_{oc}			dB	_1	.75	-1.	75	3	-1.75		
		ND EDD ED4 A	uD	-1	., 5	-1.	, ,	3	-1.73		
SS-	Confic 4.0	NR_FDD_FR1_A	4D-m/CCC	04.00	04.00	-	-		<u>-</u>		
RSRP ^{Not}	Config 1,2	NR_TDD_FR1_A	dBm/SCS	-81.93	-81.93	107.75	107.75	4	117.7		
65		1,012.0]				-113	5		

	Г	1	ı	1	T	T	T	ı	
		NR_FDD_FR1_B						-112.5	- 117.2 5
		NR_TDD_FR1_C						-112	- 116.7 5
		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	- 116.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.7 5
		NR_FDD_FR1_G							- 114.7
		NR_FDD_FR1_H						-110	5 - 114.2
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-109.5 -110	5 - 114.7 5
		NR_FDD_FR1_B						-109.5	- 114.2 5
		NR_TDD_FR1_C						-109	- 113.7 5
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	- 111.75	- 111.75	-108.5	- 113.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.7 5
		NR_FDD_FR1_G						-107	- 111.7 5
		NR_FDD_FR1_H						-106.5	- 111.2 5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							
SS-RSRQ	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76 T
		NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-83.28	- 85.83
		NR_FDD_FR1_B						-82.78	- 85.33
lo ^{Note3}	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D	dBm/SCS		50	75	.83	-82.28	84.83
10	Coming 1,2	NR_FDD_FR1_D NR_FDD_FR1_E	ubiii/303	-	JU	-/5	.03	-81.78	84.33
		NR_TDD_FR1_E						-81.28	83.83
		NR_FDD_FR1_G						-80.28 -79.78	82.83
		NR_FDD_FR1_H						-19.18	82.33

		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-76.73		-77.19	- 79.73
		NR_FDD_FR1_B						-76.69	- 79.23
		NR_TDD_FR1_C						-76.19	- 78.73
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-:	50			-75.69	- 78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	- 77.73
		NR_FDD_FR1_G						-74.19	- 76.73
		NR_FDD_FR1_H						-73.69	- 76.53
Propagation	on condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna co	onfiguration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.3 SS-SINR

A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Paran	neter	Unit	Tes		Tes		
			Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	Config 1		tre	q1 F	DD free	71	
Duplex mode	Config 2,3				DD DD		
	Config 1				plicable		
TDD configuration	Config 2			TDDC	onf.1.1		
, and the second	Config 3			TDDConf.2.1			
Downlink initial BWP configuration				DLBV	VP.0.1		
Downlink dedicated BV				DLBV	VP.1.1		
Uplink initial BWP conf				ULBV	VP.0.1		
Uplink dedicated BWP				ULBV	VP.1.1		
DRX Cycle configuration		ms		Not An	plicable		
TRS configuration	Config 1				.1 FDD		
	Config 2			TRS.1	.1 TDD		
	Config 3		TRS.1.2 TDD				
	Config 1		SR.1.1 SR.1.1 FDD FDD				
PDSCH Reference measurement	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	
channel	Config 3		SR.2.1 TDD		SR2.1 TDD		
	Config 1		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD		
	Config 3		CR.2.1 TDD		CR.2.1 TDD		
	Config 1		CCR.1. 1 FDD		CCR.1.1 FDD		
Dedicated CORESET Reference Channel	Config 2		CCR.1. 1 TDD	-	CCR.1.1 TDD	-	
	Config 3		CCR.2. 1 TDD		CCR.2.1 TDD		
OCNG Patterns				O	P.1		
SS-RSSI-Measuremen	t			Not Ap	plicable		
SMTC configruation				SM	TC.1		
CCD and for the first	Config 1,2			SSB.	1 FR1		
SSB configuration	Config 3			SSB.	2 FR1		
PDSCH/PDCCH	Config 1,2	1.11_		,	15		
subcarrier spacing Config 3		kHz		3	30		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMR EPRE ratio of PBCH to PE EPRE ratio of PDCCH DM EPRE ratio of PDCCH to	RS to SSS BCH DMRS MRS to SSS	dB	B 0 0 0			0	
EPRE ratio of PDSCH DM EPRE ratio of PDSCH to I	IRS to SSS						

EPRE ratio	of OCNG DM	RS to SSS/Note 1)						
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			1					
$N_{oc}^{}$ Note2		NR_FDD_FR1_A, NR_TDD_FR1_A				-116		
		NR_FDD_FR1_B	dBm/15kH			-115.5		
		NR_TDD_FR1_C		-93		-115		
		NR_FDD_FR1_D,	Z Z			-114.5		
		NR_TDD_FR1_D NR_FDD_FR1_E,				-114		
		NR_TDD_FR1_E						
		NR_FDD_FR1_G				-113		
	I	NR_FDD_FR1_H				-112.5		
	Config 1,2			-6	-93		Same as Noc for 15 kHz	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6				-113		
		NR FDD FR1 B	-			-11:	2.5	
N_{oc} Note2		NR_TDD_FR1_C	dBm/SCS			-11		
	Config 3	NR_FDD_FR1_D,		-6	90	-11	1.5	
		NR_TDD_FR1_D NR_FDD_FR1_E,	-					
		NR_TDD_FR1_E				-11	11	
		NR_FDD_FR1_G				-110		
^ /		NR_FDD_FR1_H				-109.5		
\hat{E}_{s}/I_{ot}			dB	0	-3.19	-5.46	-5.46	
\hat{E}_{s}/N_{oc}			dB	4.54	2.66	-4	-4	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		-88.46 -85.46	-90.34 -87.34	-120	-120	
	Config 1,2 Config 3	NR_FDD_FR1_B				-119.5	-119.5	
		NR_TDD_FR1_C				-119	-119	
		NR_FDD_FR1_D,				-118.5	-118.5	
		NR_TDD_FR1_D NR_FDD_FR1_E,						
		NR_TDD_FR1_E				-118	-118	
SS-		NR_FDD_FR1_G				-117	-117	
RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS			-116.5	-116.5	
e3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6				-117	-117	
		NR_FDD_FR1_B]			-116.5	-116.5	
		NR_TDD_FR1_C	-			-116	-116	
		NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5	-115.5	
		NR_FDD_FR1_E,	1			-115	-115	
		NR_TDD_FR1_E				444	444	
		NR_FDD_FR1_G NR_FDD_FR1_H				-114 -113.5	-114 -113 5	
SS-SINR Note3		NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6			2.10	-113.5	-113.5	
		NR_FDD_FR1_B NR_TDD_FR1_C	۸D	0		E 46	E 46	
SO-SINK"		NR_FDD_FR1_D,	dB	0	-3.19	-5.46	-5.46	
		NR_TDD_FR1_D	-					
		NR_FDD_FR1_E, NR_TDD_FR1_E						
		NR_FDD_FR1_G	1					

		Lup epp ep				1	
	1	NR_FDD_FR1_H					
		NR_FDD_FR1_A,				-85.	51
		NR_TDD_FR1_A					
		NR_FDD_FR1_B	dBm/ 9.36MHz			-85.	01
		NR_TDD_FR1_C			7.5	-84.	
	Config					-84.	01
	1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-5		-04.	O I
		NR FDD FR1 E,				-83.	51
		NR_TDD_FR1_E,				00.	01
		NR FDD FR1 G				-82.	51
IoNote3		NR_FDD_FR1_H				-82.	01
10							
	Config 3	NR_FDD_FR1_A,		-51	1.41	-79.	41
		NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz				
		NR_FDD_FR1_B				-78.	91
		NR_TDD_FR1_C				-78.	41
		NR_FDD_FR1_D,				-77.	91
		NR_TDD_FR1_D	30. TOWITIZ				
		NR_FDD_FR1_E,				-77.	41
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-76.	41
		NR_FDD_FR1_H				-75.	91
Propagation condition		-	AWGN				
Antenna configuration			-	1x2			
Note 1:	OCNG shall	he used such that both	calls are fully	are fully allocated and a constant total			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
		Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	Carefin 4		freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode Config 1 Config 2,3			FDD TDD						
	Config 1				Not App				
TDD configuration	Config 2		TDDConf.1.1						
-	Config 3		TDDConf.2.1						
Downlink initial BWP cor	figuration		DLBWP.0.1						
Downlink dedicated BWF	configuration		DLBWP.1.1						
Uplink initial BWP config	uration				ULBW				
Uplink dedicated BWP co	onfiguration				ULBW	/P.1.1			
DRX Cycle configuration		ms	Not Applicable						
TRS configuration	Config 1				TRS.1.				
	Config 2				TRS.1.				
	Config 3				TRS.1.	2 TDD			
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	_	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD		
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD		
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD		
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD		
OCNG Patterns			OP.1						
SS-RSSI-Measurement		Not Applicable							
SMTC configuration		SMTC.1							
SSB configuration	Config 1,2		SSB.1 FR1						
COD Configuration	Config 3		SSB.2 FR1						
	Config 1,2	kHz			15				

PDSCH/PI	DCCH	20							
subcarrier spacing			30						
EPRE ratio of PSS to SSS									
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS				_	_	_	_	_	
EPRE ratio of PDCCH to PDCCH DMRS			dB	0	0	0	0	0	0
	of PDSCH DMR								1
	EPRE ratio of PDSCH to PDSCH								
	of OCNG DMRS								
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1)							
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	-					-119.5	
		NR_FDD_FR1_B						-119	
		NR_TDD_FR1_C							-118.5
N_{oc}	Config 1,2	NR_FDD_FR1_D	dBm/15kHz	_,	88	-10	8.5		
Note2	Comig 1,2	NR_TDD_FR1_D	abili/ fortiz	· '	50	10	0.0	-11	18
		•							
		NR_FDD_FR1_E						-11	7.5
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-11	
		NR_FDD_FR1_H					[16
N oc	Config 1,2 N		-88		88	-108.5		Same as Noc for 15kHz T	
Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15kHz					-116.5	
		NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						-116	
								-115.5	
				-85		-105.5		4.	
								-115	
								-114.5	
								-11/15	
								-114.5 -113	
A /		dB	-1.75	-1.75	20	20	-4.0	-4.0	
\hat{E}_s/N_{oc}		dB	-1.75		20		-4.0		
	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS					-123.5	
		NR_FDD_FR1_B		1				-123	
		NR_TDD_FR1_C						-12	2.5
SS- RSRP		NR_FDD_FR1_D NR_TDD_FR1_D		-89.75		-88.5		-122	
Note3		NR_FDD_FR1_E						-121.5	
		NR_TDD_FR1_E		1					
		NR_FDD_FR1_G						-12	
		NR_FDD_FR1_H						-120	
	Config 3	NR_FDD_FR1_A		-86.75		-85.5		-120.5	
	90			-00.73		-00.0		120.0	

		NR_TDD_FR1_A				
	}	NR_FDD_FR1_B				-120
	}	NR TDD FR1 C				-119.5
		NR_FDD_FR1_D				
		NR_TDD_FR1_D				-119
		NR_FDD_FR1_E				-118.5
	-	NR_TDD_FR1_E				
	}	NR_FDD_FR1_G NR_FDD_FR1_H				-117.5 -117
		NR_FDD_FR1_A				-117
		NR_TDD_FR1_A				
		NOTE 6				
		NR_FDD_FR1_B				
SS-SINR ^{Note3}		NR_TDD_FR1_C	.ID	4.75	00	4.0
55-5INK1000		NR_FDD_FR1_D NR_TDD_FR1_D	dB	-1.75	20	-4.0
	•	NR FDD FR1 E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
1		NR_FDD_FR1_H				
		NR_FDD_FR1_A NR_TDD_FR1_A				00.00
		NOTE 6				-90.09
	}	NR_FDD_FR1_B				-89.59
		NR_TDD_FR1_C	dDm/			-89.09
Co	onfig 1,2	NR_FDD_FR1_D	dBm/ 9.36MHz	-57.83	-60.5	-88.59
	,	NR_TDD_FR1_D	0.00			-
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09
	}	NR_FDD_FR1_G				-87.09
Io ^{Note3}	Ì	NR_FDD_FR1_H				-86.59
10		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-84
	ŀ	NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C	-ID /			-83
Co	onfig 3	NR_FDD_FR1_D	dBm/ 38.16MHz	-51.73	-54.41	-82.5
	ŀ	NR_TDD_FR1_D	JO. I UIVITIZ			-02.0
		NR_FDD_FR1_E				-82
	}	NR_TDD_FR1_E NR_FDD_FR1_G				-81
	-	NR FDD FR1 H				-80.5
Propagation co	ondition		-		AWGN	
Antenna config			-		1x2	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in clause 3.5.2.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.4 L1-RSRP measurement for beam reporting

A.6.7.4.1 SSB based L1-RSRP measurement

A.6.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.6.7.4.1.1-1.

Table A.6.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.6.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

	Parameter	Config	Unit	Test 1	Test 2
CCD CC			Unit		
SSB GS	CN	1~3		freq1	freq1
D I		2	<u> </u>	FDD	FDD
Duplex n	Duplex mode		-	TDD	TDD
<u>'</u>		3		TDD	TDD
		2	 	N/A	N/A
TDD Cor	TDD Configuration		ļ	TDDConf.1.1	TDDConf.1.1
				TDDConf.2.1	TDDConf.2.1
		1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channe}	el	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
		3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
DDCCII	Deference	1		SR.1.1 FDD	SR.1.1 FDD
	Reference	2		SR.1.1 TDD	SR.1.1 TDD
measure	ement channel	3	ĺ	SR.2.1 TDD	SR.2.1 TDD
D1401.04	005057.0.7	1		CR.1.1 FDD	CR.1.1 FDD
	ORESET Reference	2	1	CR.1.1 TDD	CR.1.1 TDD
Channel		3		CR.2.1 TDD	CR.2.1 TDD
		1		CCR.1.1 FDD	CCR.1.1 FDD
	ed CORESET	2	1	CCR.1.1 TDD	CCR.1.1 TDD
Reference	ce Channel	3	}	CCR.2.1 TDD	CCR.2.1 TDD
		1		SSB.3 FR1	SSB.3 FR1
SSB con	nfiguration	2	1	SSB.3 FR1	SSB.3 FR1
33D CON	ingulation	3	+	SSB.4 FR1	SSB.4 FR1
OCNC F	OCNG Patterns				
OCNG P	raitems	1~3		OP.1	OP.1
Initial BV	Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
		1		TRS.1.1 FDD	TRS.1.1 FDD
TRS con	nfiguration	2	1	TRS.1.1 TDD	TRS.1.1 TDD
	J	3	ĺ	TRS.1.2 TDD	TRS.1.2 TDD
5 " ·	15145 (1			DLBWP.1.1	DLBWP.1.1
Dedicate	ed BWP configuration	1~3		ULBWP.1.1	ULBWP.1.1
SMTC co	onfiguration	1~3		SMTC.1	SMTC.1
	onfigType	1~3		periodic	periodic
reportQu		1~3		ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~3		2	2
	P reporting period	1~3		slot80	slot80
EPRE ratio	o of PSS to SSS	1 - 3		310100	310100
EPRE ratio	o of PBCH DMRS to SSS				
	o of PBCH to PBCH DMRS				
EPRE ratio	o of PDCCH DMRS to SSS				
	o of PDCCH to PDCCH				
DMRS	{ DD00H DMD0 +- 000	1 2	40		_
	o of PDSCH DMRS to SSS	1~3	dB	0	0
DMRS	o of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}					
EPRE ratio of OCNG to OCNG					
DMRS Note					
	NR_FDD_FR1_A, NR_TDD_FR1_A				-117
	NOTE 5				
N_{oc}	NR_FDD_FR1_B				-116.5
Note2	NR_TDD_FR1_C	1~3	dBm/15kHz	-94.65	-116
	NR_FDD_FR1_D,				-115.5
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115

	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	NR FDD FR1 B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2		-94.65	-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_G		dDm/CCD		-114
N_{oc}	NR_FDD_FR1_H		dBm/SSB SCS		-113.5
Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-114
	NR FDD FR1 B				-113.5
	NR TDD FR1 C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		-91.65	-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
\hat{E}_{s}/I_{ot}		1~3	dB	10	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	1,2			-120
	NR_FDD_FR1_B			-84.65	-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
SSB	NR_FDD_FR1_G				-117
RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5		SCS		-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3		-81.65	-115.5
	NR_TDD_FR1_D				-110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				1.5.5
	NR_TDD_FR1_A NOTE 5				-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C		dBm/9.36		-86.28
lo Note3	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2	MHz	-56.28	-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78

	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dBm/38.16		-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3	MHz	-50.19	-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}		1~3	dB	10	-3
Propagat	ion condition	1~3		AWGN	AWGN
Antenna	configuration	1~3		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.6.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
	1		FDD	FDD
Duplex mode	2	1	TDD	TDD
'	3	1	TDD	TDD
	1		N/A	N/A
TDD Configuration	2	1	TDDConf.1.1	TDDConf.1.1
. 2 2 com garanon	3	1	TDDConf.2.1	TDDConf.2.1
	1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1	_	SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
moded of the original or	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1]	CR.1.1 FDD	CR.1.1 FDD
Channel	2]	CR.1.1 TDD	CR.1.1 TDD
Onaillei	3		CR.2.1 TDD	CR.2.1 TDD
Dadisated CODECET	1		CCR.1.1 FDD	CCR.1.1 FDD
Dedicated CORESET	2]	CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3	1	CCR.2.1 TDD	CCR.2.1 TDD
	1		SSB.1 FR1	SSB.1 FR1
SSB configuration	2	1	SSB.1 FR1	SSB.1 FR1
ooz ooga.ao	3		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~3		OP.1	OP.1
CONC Lattorio	1		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2	1	TRS.1.1 TDD	TRS.1.1 TDD
1103 configuration	3		TRS.1.2 TDD	TRS.1.1 TDD
	3		DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1	ULBWP.0.1
			DLBWP.1.1	DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
CW10 comigaration	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2	1	CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
OOI-100	3	1	CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
roportConfigTypo		 		
reportConfigType	1~3		periodic ori BSBB	periodic ori BSBB
reportQuantity	1~3	1	cri-RSRP	cri-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS		<u></u>	_	_
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0	0
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				
NR_FDD_FR1_A,				
N _{oc} NR_TDD_FR1_A		1		-117
Note2 NOTE 5	1~3	dBm/15kHz	-94.65	
NR FDD FR1 B	1 -0	GDIII, IONI IZ	G 7.00	-116.5
NR_TDD_FR1_C	-			-116

	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-117
	NOTE 5				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2		-94.65	-116
	NR_TDD_FR1_D	.,_			-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_G		dDm/CCL DC		-114
N_{oc}	NR_FDD_FR1_H		dBm/CSI-RS SCS		-113.5
Note2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C			04.05	-114
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		-91.65	-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~3	dB	10	-3
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5			-84.65	-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C	4.0			-119
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2			-118.5
	NR_FDD_FR1_E,		dBm/CSI-RS SCS		-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-117
CSI-RS	NR FDD FR1 H				-116.5
RSRP Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C			04.05	-116
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		-81.65	-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E NR_FDD_FR1_G				-114
	NR FDD FR1 H				-113.5
			+		
	NR_FDD_FR1_A,				
					-87.28
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B		dBm/9.36		-86.78
lo ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C	1,2	dBm/9.36 MHz	-56.28	
lo ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	1,2		-56.28	-86.78
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C	1,2		-56.28	-86.78 -86.28

NR_FDD_FR1_G				-84.28
NR_FDD_FR1_H				-83.78
NR_FDD_FR1_A,				
NR_TDD_FR1_A				-81.19
NOTE 5				
NR_FDD_FR1_B				-80.69
NR_TDD_FR1_C		dBm/38.16		-80.19
NR_FDD_FR1_D,	3	MHz	-50.19	-79.69
NR_TDD_FR1_D		IVII IZ		-13.03
NR_FDD_FR1_E,				-79.19
NR_TDD_FR1_E				73.13
NR_FDD_FR1_G				-78.19
NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}	1~3	dB	10	-3
Propagation condition	1~3		AWGN	AWGN
Antenna configuration	1~3		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.19.2.

A.6.7.5 E-UTRAN RSRP

A.6.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.2 for SA inter-RAT E-UTRAN RSRP measurements.

A.6.7.5.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.5.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRP are tested by using the parameters in A.6.7.5.1.2-2 and A.6.7.5.1.2-3.

Table A.6.7.5.1.2-1: Inter-RAT E-UTRAN RSRP supported test configurations with FR1 serving cell

Configuration	on Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The	UE is only required to be tested in one of the supported test configurations

Table A.6.7.5.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Duplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
_	Config 3, 6		TDDConf.1.2	
	Config 1, 4		10: N _{RB,c} = 52 (FDD)	
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)	
	Config 3, 6		40: N _{RB,c} = 106 (TDD)	
Gap pattern Id			0	
DDCCI I reference measurement	Config 1, 4		SR.1.1 FDD	
PDSCH reference measurement channel	Config 2, 5		SR.1.1 TDD	
Channel	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
	Initial DL BWP		DLBWP.0.1	
DIMP	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern ^{Note1}			OP.1	
SMTC configuration			SMTC.1	
•	Config 1, 2, 4, 5		SSB.1 FR1	
SSB configuration	Config 3, 6		SSB.2 FR1	
EPRE ratio of PSS to SSS	<u> </u>			
EPRE ratio of PBCH_DMRS to SSS	3			
EPRE ratio of PBCH to PBCH_DMF				
EPRE ratio of PDCCH_DMRS to SS	SS			
EPRE ratio of PDCCH to PDCCH_0	OMRS	dB	0	
EPRE ratio of PDSCH_DMRS to SS				
EPRE ratio of PDSCH to PDSCH_D				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMI				
N _{oc} Note2		dBm/15 kHz	-104	
	Config 1, 2, 4, 5		-104	
N _{oc} Note2	Config 3, 6	dBm/SCS	-101	
Ês/N _{oc}	, <i>,</i>	dB	17	
Ê _s /I _{ot} ^{Note3}		dB	17	
	Config 1, 2, 4, 5	4D/COO	-87	
SS-RSRP ^{Note3}	Config 3, 6	dBm/SCS —	-84	
OOD DDNoto2	Config 1, 2, 4, 5	ID (0.00	-87	
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS	-84	
I Note?	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
Io ^{Note3}	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition	1 2 3 7		AWGN	
Antenna Configuration and Correlat	ion Matrix		1x2	
N			125	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Test 1	Parameter		Unit	Cell 2		
Duplex mode						
TDD TDD	E-UTRA RF channel numb	per		,		
TDD special subframe Config 1, 2, 3 Config 4, 5, 6 G	Duplex mode	Config 1, 2, 3		FDD		
Config 4, 5, 6 6		Config 4, 5, 6		TE	D	
TDD uplink-downlink Config 1, 2, 3 N/A	TDD special subframe	Config 1, 2, 3		N,	/A	
Config 4, 5, 6 MHz Shifts Shift						
BWchannel BMdz	TDD uplink-downlink	Config 1, 2, 3		N.	/A	
10 MHz: Nac. = 50	configurationNote1	Config 4, 5, 6		,		
PDSCH parameters:	BW _{channel}		MHz	5 MHz: N	I _{RB,c} = 25	
DDSCH parameters: DD. Reference Measurement Channel None						
Dick Reference Measurement Channel Note				20 MHz: N	$I_{RB,c} = 100$	
Config 1, 2, 3 S MHz: R.11 FDD				•	•	
Darameters: 10 MHz; R.6 FDD 20 MHz; R.10 FDD 20 MHz; R.10 FDD 3 MHz; R.10 FDD 10 MHz; R.6 TDD 20 MHz; R.10 FDD 20 MHz; R.10 FDD 20 MHz; R.10 FDD 20 MHz; R.10 FDD 20 MHz; R.10 FDD 20 MHz; OP.19 FDD 10 MHz; OP.19 FDD 10 MHz; OP.19 FDD 20 MHz; OP.19 FDD 20 MHz; OP.10 FDD 20 MHz; OP.10 FDD 20 MHz; OP.10 FDD 20 MHz; OP.8						
DL Reference Config 4, 5, 6 S MHz: R.10 FDD		Config 1, 2, 3				
Measurement ChannelNote2						
ChannelNote2						
Config 1, 2, 3 S MHz: R.10 TDD		Config 4, 5, 6				
Config 1, 2, 3	ChannelNote2					
10 MHz: OP.6 FDD 20 MHz: OP.14 FDD 5 MHz: OP.10 TDD 10 MHz: OP.2 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD 20 MHz: OP	No.					
Config 4, 5, 6 Conf	OCNG Patterns ^{Note2}	Config 1, 2, 3			-	
Config 4, 5, 6 5 MHz: OP.10 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD						
10 MHz: OP.2 TDD			_			
BBCH_RA PBCH_RB PSS_RA PCFICH_RB PHICH_RA PDCFICH_RB PDCCH_RB	Config 4, 5, 6					
PBCH_RA PBCH_RB PBS_RA SSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RB DPCCH_RA PDCCH_RA PDCCH_RA PDSCH_RA PDSCH_RB DSCH_RB DCNG_RANote3 DCNG_RANote3 DCNG_RBNote3 Bands_FDD_B1, FDD_B2_Note10 Bands_FDD_C, TDD_C Bands_FDD_C, TDD_E Bands_FDD_E, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_B Bands_FDD_B, FDD_						
PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RA PDCCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RANote3 OCNG_RBNote3	DDCH DA			20 MHZ. (טעו אינ	
PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RA PHICH_RB PDCCH_RA PDCCH_RB PDCCH_RA PDSCH_RB PDSCH_RA PDSCH_RB P						
SSS_RA PCFICH_RB PHICH_RA						
PCFICH_RB						
PHICH_RA						
PHICH_RB						
PDCCH_RA			dD	(١	
PDCCH_RB			uБ	(,	
PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_G Note 8 Bands FDD_A Note 9, TDD_A Bands FDD_A Note 9, TDD_A Bands FDD_A Note 9, TDD_A RSRPNote5 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C Calculate						
PDSCH_RB						
OCNG_RANote3 Bands FDD_A Note 9, TDD_A -117 NocNote4 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H -91.65 -116.5 Es/Noc Bands FDD_G Note 8 Bs/Ior Note5 Bands FDD_A Note 9, TDD_A Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C -81.65 -121 RSRPNote5 Bands FDD_C, TDD_C -120.5 -120.5						
Bands FDD_A Note 9, TDD_A						
Bands FDD_A Note 9, TDD_A						
Noc Note4 Bands FDD_B1, FDD_B2 Note 10 -116.5 -116.5 -116.5	OCNG_RB	Rands FDD Δ Note 9				
Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C C C C C C C C C C					-117	
FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_B Bands FDD_E, FDD_F Bands FDD_G Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_H Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C C C C C C C C C C					445 =	
Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H		FDD B2 Note 10			-116.5	
Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H	N. Noto4		ID (4=:::	04.07	-116	
Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H E₅/Noc Bands FDD_H Bands FDD_A Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C Bands FDD_C, TDD_C -115 -11	Noc ¹⁴⁰¹⁶⁴		dBm/15kHz	-91.65		
Note 7, TDD_E Bands FDD_G Note 8 -114		Bands FDD_E, FDD_F				
Bands FDD_H -113.5 Ês/Noc dB 10 -4 Ês/Iot ^{Note5} dB 10 -4 Bands FDD_A Note 9, TDD_A TDD_A -121 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C dBm/15kHz -81.65 -120.5 Bands FDD_C, TDD_C -120 -120					-175	
Bands FDD_H -113.5 Ês/Noc dB 10 -4 Ês/Iot ^{Note5} dB 10 -4 Bands FDD_A Note 9, TDD_A TDD_A -121 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C dBm/15kHz -81.65 -120.5 Bands FDD_C, TDD_C -120 -120		Bands FDD_G Note 8				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					-113.5	
Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C -121 -81.65 -120	Ë _s /N _{oc}					
TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_C, TDD_C	Ë _s /I _{ot} ^{Note5}	T	dB	10	-4	
RSRP ^{Note5} Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C -120.5 -120.5					-121	
Bands FDD_C, TDD_C -120	RSRP ^{Note5}	Bands FDD_B1,	dBm/15kHz	-81.65	-120.5	
					-120	

	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9, TDD_A			-121
SCH_RPNote5	Bands FDD_B1, FDD_B2 Note 10			-120.5
	Bands FDD_C, TDD_C	JD /451.11-	04.05	-120
	Bands FDD_D	dBm/15kHz	-81.65	-119.5
	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9, TDD_A			-87.76 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10			-87.26 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C			-86.76 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53.45 + 10log(N _{RB,c} /50)	-86.26 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F			-85.76 +
	Note 7, TDD_E			10log(N _{RB,c} /50)
	Bands FDD G Note 8			-84.76 +
				10log(N _{RB,c} /50)
	Bands FDD H			-84.26 +
Donne we there we will!			A 1 A J	10log(N _{RB,c} /50)
Propagation Condition				GN
Antenna Configuration and	Correlation Matrix		1>	< 2

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.5.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRP measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.2.

A.6.7.6 E-UTRAN RSRQ

A.6.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.3 for SA inter-RAT E-UTRAN RSRQ measurements.

A.6.7.6.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.6.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRQ are tested by using the parameters in A.6.7.6.1.2-2 and A.6.7.6.1.2-3.

Table A.6.7.6.1.2-1: Inter-RAT E-UTRAN RSRQ supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.6.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit	С	ell 1	
NR RF channel number				1	
Duplex mode	Config 1, 4		F	DD	
Duplex mode	Config 2, 3, 5, 6		٦	TDD	
	Config 1, 4			N/A	
TDD Configuration	Config 2, 5			Conf.1.1	
-	Config 1, 4 Config 2, 3, 5, 6 Config 1, 4 Config 3, 6 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Initial DL BWP Dedicated DL BWP Initial UL BWP Dedicated UL BWP Dedicated UL BWP Config 3, 6 RS to SSS BCH_DMRS MRS to SSS PDCCH_DMRS MRS to SSS PDCCH_DMRS RS to SSS Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6 Config 1, 2, 4, 5 Config 3, 6		TDDConf.1.2		
	Config 1, 4		10: N _{RB,c}	= 52 (FDD)	
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c}	= 52 (TDD)	
	Config 3, 6		40: N _{RB,c}	= 106 (TDD)	
Gap pattern Id				0	
DDCCII reference me comment	Config 1, 4		SR.1	.1 FDD	
PDSCH reference measurement			SR.1	.1 TDD	
channel			SR.2	2.1 TDD	
			CR.1	.1 FDD	
CORSET reference channel				.1 TDD	
	Config 2, 3, 5, 6 Config 1, 4 Config 3, 6 TDE Config 1, 4 10: NRB Config 2, 5 MHz 10: NRB Config 3, 6 40: NRB, Config 1, 4 SR Config 3, 6 SR Config 3, 6 SR Config 3, 6 CR Config 3, 6 CR Initial DL BWP DL Dedicated DL BWP UL Initial UL BWP UL Dedicated UL BWP UL SS SS OMRS SS OMRS GS SS OMRS GS GB Config 3, 6 dB In Config 1, 2, 4, 5 GB Config 3, 6 dB In Config 1, 2, 4, 5 GB Config 3, 6 GB Con	2.1 TDD			
			DLB	WP.0.1	
	Dedicated DL BWP		DLB	WP.1.1	
BWP configurations	Initial UL BWP		ULB	WP.0.1	
	Dedicated UL BWP		ULB	WP.1.1	
OCNG pattern ^{Note1}			()P.1	
SMTC configuration				MTC.1	
•	Config 1, 2, 4, 5		SSB.1 FR1 SSB.2 FR1		
SSB configuration	Config 3, 6	†			
EPRE ratio of PSS to SSS	<u> </u>		OOB.211(1		
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMF					
EPRE ratio of PDCCH_DMRS to SS					
EPRE ratio of PDCCH to PDCCH_D		dB	0		
EPRE ratio of PDSCH_DMRS to SS		1 "-			
EPRE ratio of PDSCH to PDSCH_D					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMI					
N _{oc} Note2		dBm/15 kHz	_	104	
	Config 1, 2, 4, 5			104	
N _{oc} Note2		dBm/SCS		101	
Ê _s /N _{oc}		dB		7	
Ês/lot ^{Note3}				7	
	Config 1, 2, 4, 5	<u> </u>		-97	
SS-RSRQ ^{Note3}		dBm/SCS		-94	
Nu.0				-97	
SSB_RP ^{Note3}		dBm/SCS		-94	
		dBm/9.36 MHz	-58.96	-68.26	
Io ^{Note3}		dBm/38.16 MHz	-52.87	-62.17	
Propagation condition	1 coming o, o	GETTI/OUT TO TWITTE		WGN	
Antenna Configuration and Correlation	ion Matrix			1x2	
A THOMAS COMMISSION AND CONTEST	.GIT WIGHTA			174	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRQ, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.6.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Test 1 Test 2 Test 3	Parameter		Unit	Cell 2			
E-UTRA RF channel number				Test 1		Test 3	
Config 4, 5, 6	E-UTRA RF channel numb	er			1		
TDD special subframe	Duplex mode	Config 1, 2, 3			FDD		
configration/Note1 Config 4, 5, 6 6 TDD uplink-downlink configuration Note1 Config 1, 2, 3 N/A SW channel Config 4, 5, 6 1 BW channel MHz 5 MHz: NRB,c = 25 10 MHz: NRB,c = 50 20 MHz: NRB,c = 50 20 MHz: NRB,c = 50 20 MHz: NRB,c = 100 PDSCH parameters: DL Reference Measurement ChannelNote2		Config 4, 5, 6			TDD		
TDD uplink-downlink	TDD special subframe	Config 1, 2, 3			N/A		
Configuration Config 4, 5, 6					6		
BW channel	TDD uplink-downlink	Config 1, 2, 3			N/A		
10 MHz: N _{RB,c} = 50		Config 4, 5, 6					
PDSCH parameters: DL Reference Measurement ChannelNote2 PCFICH/PDCCH/PHICH parameters: DL Reference Measurement ChannelNote2 S MHz: R.11 FDD	BW _{channel}		MHz	·			
PDSCH parameters:							
DL Reference Measurement Channel Note			2	0 MHz : $N_{RB,c} = 10$	00		
PCFICH/PDCCH/PHICH parameters:		The state of			-		
Discrimination of the content of t							
DL Reference 20 MHz: R.10 FDD							
Measurement ChannelNote2							
ChannelNote2			-				
Config 1, 2, 3 S MHz: R.10 TDD		Config 4, 5, 6					
Config 1, 2, 3 5 MHz: OP.19 FDD 10 MHz: OP.6 FDD 20 MHz: OP.14 FDD	Channelliolez						
10 MHz: OP.6 FDD 20 MHz: OP.14 FDD	OCNO Dette ve a Note?	Cartin 4 0 0					
Config 4, 5, 6 S MHz: OP.14 FDD	OCNG Patterns 1982	Config 1, 2, 3					
Config 4, 5, 6							
10 MHz: OP.2 TDD 20 MHz: OP.8 TDD		Config 4 5 6	1				
PBCH_RA PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RB PHICH_RB PDCCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RB PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 -119		Coning 4, 5, 6					
PBCH_RA PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RA PHICH_RB OCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 -119							
PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RA PHICH_RB PDCCH_RA PDCCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,	PBCH RA						
PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RB O PDCCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RA POSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,			†				
SSS_RA			+				
PCFICH_RB PHICH_RA PHICH_RB OCCH_RA PDCCH_RA PDSCH_RB PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 FD_B2 Note 10 ABANA FDD_B2 Note 10 FD_B2 Note 10 ABANA FDD_B2 Note 10 BANA FDD_B2 Note 10 CABANA FDD_B2 FDD_B1, FDD_B2 Note 10							
PHICH_RA							
PHICH_RB							
PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,			dB	0			
PDCCH_RB PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,							
PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,			1				
PDSCH_RB OCNG_RA ^{Note3} OCNG_RB ^{Note3} Bands FDD_A ^{Note 9} ,			†				
OCNG_RANote3 OCNG_RBNote3 Bands FDD_A Note 9,			1				
OCNG_RBNote3 Bands FDD_A Note 9,							
Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 -119.5							
TDD_A Bands FDD_B1, FDD_B2 Note 10 -119		Bands FDD_A Note 9,				110 5	
FDD_B2 Note 10		TDD_A				-119.5	
FDD_B2 Note to						-110	
]			-118	
	Na. Note4	Bands FDD_C, TDD_C	dBm/15kH-	-83	-104 70		
Bands FDD_D -118	INOC		ubiii/ IOKHZ	-03	-104.70	-118	
Bands FDD_E, FDD_F						-1175	
100			<u> </u>				
Bands FDD_G Note 8 -116.5							
Bands FDD_H -116	A /h.i	Bands FDD_H					
$\frac{E_s/N_{oc}}{f}$ dB -1.75 -4.0 -4.0	Ês/Noc						
Ês/lot ^{Note5} dB -1.75 -4.0 -4.0	E _S /I _{ot} ^{Notes}	December 500 A Note 0	dB	-1.75	-4.0	-4.0	
Bands FDD_A Note 9, TDD_A -123.5		TDD_A				-123.5	
RSRP ^{Note5} Bands FDD_B1, FDD_B2 Note 10 dBm/15kHz -84.75 -108.70 -123	RSRP ^{Note5}	Bands FDD_B1, FDD_B2 Note 10	dBm/15kHz	-84.75	-108.70	-123	
Bands FDD_C, TDD_C			†			-122.5	
Bands FDD_D -122			1				

					I
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
	Bands FDD_A Note 9, TDD_A Bands FDD_B1,				
	FDD_B2 Note 10				
RSRQ ^{Note5}	Bands FDD_C, TDD_C	dB	-14.76	-16.25	-16.25
	Bands FDD_D				
	Bands FDD_E, FDD_F Note 7, TDD_E				
	Bands FDD_G Note 8				
	Bands FDD_H				
	Bands FDD_A Note 9, TDD_A				-90.26 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10				-89.76 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C				-89.26 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53 + 10log(N _{RB,c} /50)	-75.46 + 10log(N _{RB,c} /50)	-88.76 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F			,	-88.26 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-87.26 + 10log(N _{RB,c} /50)
	Bands FDD_H				-86.76 + 10log(N _{RB,c} /50)
Propagation Condition			AWGN		
Antenna Configuration and	Correlation Matrix			1x2	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 5: Ê_s/I_{ot}, RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.6.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRQ measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.3.

A.6.7.7 E-UTRAN RS-SINR

A.6.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.4 for SA inter-RAT E-UTRAN RS-SINR measurements.

A.6.7.7.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.7.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RS-SINR are tested by using the parameters in A.6.7.7.1.2-2 and A.6.7.7.1.2-3.

Table A.6.7.7.1.2-1: Inter-RAT E-UTRAN RS-SINR supported test configurations with FR1 serving cell

Configura	tion Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: Th	e UE is only required to be tested in one of the supported test configurations

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
Duplex mode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		1
	Config 1, 4		
BWchannel	Config 2, 5	MHz	
	Config 3, 6		40: N _{RB,c} = 106 (TDD)
Gap pattern Id			
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Chamer	Config 3, 6		SR.2.1 TDD
	Config 1, 4		
CORSET reference channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		
	Initial DL BWP		DLBWP.0.1
BWP configurations	Dedicated DL BWP		DLBWP.1.1
BVVF Cornigurations	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		
OCNG pattern ^{Note1}			OP.1
SMTC configuration			
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
33B Configuration	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SS			
EPRE ratio of PBCH to PBCH_DM			
EPRE ratio of PDCCH_DMRS to S			
EPRE ratio of PDCCH to PDCCH_		dB	0
EPRE ratio of PDSCH_DMRS to S			
EPRE ratio of PDSCH to PDSCH_I			
EPRE ratio of OCNG DMRS to SS			
EPRE ratio of OCNG to OCNG DM	RS		
N _{oc} Note2		dBm/15 kHz	-104
N _{oc} Note2	Config 1, 2, 4, 5	dBm/SCS	-104
	Config 3, 6	ubili/303	-101
Ê _s /N _{oc}		dB	17
Ê _s /I _{ot} Note3		dB	
SS-RS-SINR ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
OO-IXO-OHVIX	Config 3, 6	ubili/303	-84
SSB_RP ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
00D_KF	Config 3, 6		-84
Io ^{Note3}	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN
Antenna Configuration and Correla	tion Matrix		1x2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RS-SINR, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parar	neter	Unit		Cell 2			
			Test 1 Test 2 Test 3				
E-UTRA RF channel numb	per			1			
Duplex mode	Config 1, 2, 3			FDD			
	Config 4, 5, 6			TDD			
TDD special subframe	Config 1, 2, 3			N/A			
configuration ^{Note1}	Config 4, 5, 6			6			
TDD uplink-downlink	Config 1, 2, 3			N/A			
configuration ^{Note1}	Config 4, 5, 6			11			
BW _{channel}		MHz		5 MHz: N _{RB,c} = 25			
			$0 \text{ MHz: } N_{RB,c} = 5$				
			20 MHz: N _{RB,c} = 100				
PDSCH parameters:	. Ol INloto?			-			
DL Reference Measureme	nt Channel ^{Note2}						
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDE			
parameters:				10 MHz: R.6 FDE			
DL Reference	Confin 4 5 C			20 MHz: R.10 FD			
Channel ^{Note2}	leasurement Config 4, 5, 6			5 MHz: R.11 TDE 10 MHz: R.6 TDE			
Chamer	nnel ^{Note2}						
OCNG Patterns ^{Note2}	Config 1, 2, 3		20 MHz: R.10 TDD				
Coning 1, 2, 3			5 MHz: OP.19 FDD 10 MHz: OP.6 FDD				
			20 MHz: OP.14 FDD 5 MHz: OP.10 TDD				
	Config 4, 5, 6						
	201111g 11, 0, 0			10 MHz: OP.2 TDD			
				0 MHz: OP.8 TD	_		
PBCH_RA							
PBCH_RB							
PSS_RA							
SSS_RA							
PCFICH_RB							
PHICH_RA							
PHICH_RB		dB	0				
PDCCH_RA							
PDCCH_RB							
PDSCH_RA							
PDSCH_RB							
OCNG_RA ^{Note3}							
OCNG_RB ^{Note3}	T			1			
	Bands FDD_A Note 9, TDD_A				-119.5		
	Bands FDD_B1, FDD_B2 Note 10				-119		
N _{oc1} Note4	Bands FDD_C, TDD_C	dDm/45kl l=	00	100 50	-118.5		
Noc1 Noc1	Bands FDD_D	dBm/15kHz	-88	-108.50	-118		
	Bands FDD_E, FDD_F Note 7, TDD_E				-117.5		
	Bands FDD_G Note 8	†			-116.5		
	Bands FDD_H				-116		
	Bands FDD_A Note 9, TDD_A				-113.5		
	Bands FDD_B1, FDD_B2 Note 10				-113		
N _{oc2} Note4a	Bands FDD_C, TDD_C	dBm/15kHz	-82	-114.5	-112.5		
	Bands FDD_D				-112.5		
	Bands FDD_E, FDD_F	†					
	Note 7, TDD_E				-111.5		

	Bands FDD_G Note 8				-110.5
	Bands FDD_H				-110
CRS Ê _s /N _{oc1}		dB	-1.75	-4.0	-4.0
CRS Ê _s /I _{ot} Note5		dB	-1.75	-4.0	-4.0
	Bands FDD_A Note 9, TDD_A				-123.5
CRS Ë _s /I _{ot} Note5	Bands FDD_B1, FDD_B2 Note 10				-123
RSRPNote5	Bands FDD_C, TDD_C	dBm/15kHz	-89.75	-88.50	-122.5
	Bands FDD_D	4511, 1011 12	000	00.00	-122
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
	Bands FDD_A Note 9, TDD_A				
D.C. CUAD Notes	Bands FDD_B1, FDD_B2 Note 10				
DC CINIDNote5	Bands FDD_C, TDD_C	dB	-1.75	20	-4.0
K3-SINK	Bands FDD_D	иь	-1.75	20	-4.0
	Bands FDD_E, FDD_F Note 7, TDD_E				
	Bands FDD_G Note 8				
	Bands FDD_H				
	Bands FDD_A Note 9, TDD_A				-93.48 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10				-92.98 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C				-92.48 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53.79 + 10log(N _{RB,c} /50)	-60.56 + 10log(N _{RB,c} /50)	-91.98 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-91.48 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-90.48 + 10log(N _{RB,c} /50)
	Bands FDD_H				-89.98 + 10log(N _{RB,c} /50)
Propagation Condition			<u> </u>	AWGN	<u> </u>
Antenna Configuration a	nd Correlation Matrix			1x2	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc1 to be fulfilled.

Note 4a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for N_{0c2} to be fulfilled.

Note 5: CRS \hat{E}_s/I_{ot} , RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].

Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 8: Except Band 29.

Note 9: Except Band 32, Band 75 and Band 76.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel

bandwidth within 1475.9-1510.9 MHz.

A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

A.7 NR standalone tests with one or more NR cells in FR2

A.7.1 SA: RRC_IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

A.7.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.7.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.1.2-1: Supported test configurations

Co	nfiguration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2	Cell1	
condition	Neighbour cells		1, 2	Cell2	
T2 end	Active cell		1, 2	Cell2	
condition	Neighbour cells		1, 2	Cell1	
Final condition	Visited cell		1, 2	Cell1	
RF Channe	el Number		1, 2	1	
Time offset	t between cells		1, 2	3 µs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC con	figuration		1, 2	SMTC pattern 1	
DRX cycle	length	s	1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		S	1, 2	135	T2 needs to be defined so that cell re- selection reaction time is taken into account.
Т3		S	1, 2	35	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.7.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1, 2	Т	DDConf.3.		Т	DDConf.3.	1	
PDSCH RMC		1	S	R.3.1 TDD	1		N/A		
configuration		2		R.3.1 TDD		Ì			
RMSI CORESET		1		R.3.1 TDD		CR.3.1 TDD			
RMC configuration		2		R.3.1 TDD		CR.3.1 TDD			
Dedicated CORESET		1		CR.3.1 TDI			CCR.3.1 TDD		
RMC configuration		2	CCR.3.1 TDD			С	CR.3.1 TD	D	
SSB configuration		1		SSB.3 FR2			SSB.7 FR2		
		2	,	SSB.4 FR2			SSB.8 FR2)	
OCNG Pattern		1, 2		OP.4			OP.4		
Initial DL BWP		1, 2		DLBWP.0.1			DLBWP.0.	1	
configuration		·							
Initial UL BWP		1, 2	J	JLBWP.0.1		Ų	JLBWP.0.	1	
configuration									
RLM-RS		1, 2	SSB			SSB			
Qrxlevmin	dBm/SCS	1	-140			-140			
		2	-137			-137			
Pcompensation	dB	1, 2		0		0			
Qhyst _s	dB	1, 2		0		0			
Qoffset _{s, n}	dB	1, 2	0			0			
Cell_selection_and_		1, 2							
reselection_quality_				SS-RSRP		SS-RSRP			
measurement									
AoA setup		1, 2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1			
\hat{E}_s/I_{ot}	dB	1	8	-3	1.5	-infinity	1.5	-3	
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	QD	2	O		1.5	ii ii ii ii ii y	1.5	0	
3.7	dBm/SCS	1			-93			1	
$N_{\!oc}$ Note2	abiii/000	2			-90				
3.7	dBm/15 kHz	1			-102				
$N_{\!oc}$ Note2	abili, 10 ki iz	2			102	=			
	dB	1	8	-3	1.5	-infinity	1.5	-3	
\hat{E}_{s}/N_{oc}	QD.	2	O		1.5	ii ii ii ii ii y	1.5		
SS-RSRP Note3	dBm/SCS	1	-85	-96	-91.5	-infinity	-91.5	-96	
55-101(I	ubili/oco	2	-82	-93	-88.5	-infinity	-88.5	-93	
Io on SSB symbols of	dBm/95.04 MHz	1	-59.37	-63.40	-62.47	-64.01	-62.47	-63.40	
each cell	GDIT/OU.UT WITE	2	-57.18	-62.86	-61.67	-64.01	-61.67	-62.86	
Treselection	S	1, 2	0	0	0	0	0	0	
SintrasearchP	dB	1, 2	J	50			50		
Propagation	<u> </u>	1, 2		50	AWG	iN	50		
Condition		1, 4			AVVG				
Condition		1							

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.1.1.3 **Test Requirements**

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{evaluate, NR_intra} + T_{SI-NR}$,

Where:

 $T_{detect,\;NR_Intra}$ See Table 4.2.2.3-1 in clause 4.2.2.3 See Table 4.2.2.3-1 in clause 4.2.2.3 $T_{evaluate,\;NR_\;intra}$

 $T_{\text{SI-NR}}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

A.7.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.7.1.1.2.2 **Test Parameters**

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell				
1	120 kHz SSB SCS, 100 MHz bandwidth,	120 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode	duplex mode				
2	240 kHz SSB SCS, 100 MHz bandwidth,	240 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode	duplex mode				
Note: The UE is of	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1
T1 end	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2	Cell2	during T1
T3 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3
RF Channe			1, 2	1, 2	
Time offse	t between cells		1, 2	3 µs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC con	SMTC configuration		1, 2	SMTC pattern 1	
DRX cycle	DRX cycle length		1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	PRACH configuration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	35	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2	95	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1, 2	TDDConf.3.1			TI	TDDConf.3.1		
PDSCH RMC		1, 2	S	R.3.1 TDD		N/A			
configuration									
RMSI CORESET		1, 2	CR.3.1 TDD			CR.3.1 TDD			
parameters									
RMSI CORESET		1, 2	CC	R.3.1 TDD)	C	CR.3.1 TDI)	
RMC configuration									
OCNG Pattern		1, 2	OP.1 d	efined in A.	3.2.1	OP.1 d	efined in A	.3.2.1	
Initial DL BWP		1, 2 1, 2	D	LBWP.0.1			LBWP.0.1		
configuration									
Initial UL BWP		1, 2	U	LBWP.0.1		l	JLBWP.0.1		
configuration									
RLM-RS		1, 2		SSB			SSB		
Qrxlevmin	dBm/SCS	1		-140			-140		
		2		-137			-137		
Pcompensation	dB	1, 2		0		0			
Qhysts	dB	1, 2		0		0			
Qoffsets, n	dB	1, 2		0		0			
Cell_selection_and_		1, 2							
reselection_quality_		,	SS-RSRP				SS-RSRP		
measurement									
AoA setup		1, 2							
			Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1		A.3.15.1		
Ê _s /I _{ot}	dB	1	8	8	8	-3	-infinity	8	
L _s /1 _{ot}		2							
λ7	dBm/SCS	1		-93	ı	-93			
N_{oc} Note2		2		-90		-90			
7.7	dBm/15 kHz	1		-102		-102			
$N_{_{\!OC}}$ Note2	32, . 3	2		. • =		-102			
\hat{E}_{s}/N_{oc}	dB	1	8	8	8	-3	-infinity	8	
L _s /IV _{oc}		2	· ·						
SS-RSRP Note3	dBm/SCS	1	-85	-85	-85	-96	-infinity	-85	
	uBiii/000	2	-82	-82	-82	-93	-infinity	-82	
lo	dBm/95.04 MHz	1	-55.37	-55.37	-55.37	-62.25	-infinity	-55.37	
	abilitoolo i miliz	2	-52.37	-52.37	-52.37	-59.25	-infinity	-52.37	
Treselection	S	1, 2	0 0 0		0	0	0		
SnonintrasearchP	dB	1, 2	,	50			Not sent		
Thresh _{x, high}	dB	1, 2		48			48		
Thresh _{serving, low}	dB	1, 2		44			44		
Thresh _{x, low}	dB	1, 2		50		50			
Propagation	45	1, 2		AWGN AWGN					
Condition		٠, ٢		, , , , , , , , , , , , , , , , , , , ,			, 117 014		
Condition						l			

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers Note 2:

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

Note 3: parameters themselves.

A.7.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

Thigher_priority_search See clause 4.2.2.7

 $T_{evaluate, NR_inter}$ See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 27 s.

A.7.2 SA: RRC_INACTIVE state mobility

A.7.3 RRC_CONNECTED state mobility

A.7.3.1 Handover

A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

Pa	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	[-120]	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	Barring Information		Not Sent	No additional delays in random access procedure.
Time offset betwe	en cells		3 µs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
Parameter	Unit	T1	T2	T1	T2
NR RF Channel Number		1		2	

	Config 1		FDD	TDD	
Duplex mode	Config 2,3		TDD	TDD	
	Config 1		Not Applicable	TDDConf.3.1	
TDD configuration	Config 2		TDDConf.1.1	TDDConf.3.1	
	Config 3		TDDConf.2.1	TDDConf.3.1	
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66	
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
BWP BW	Config 2	H MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
5 5	Config 3		40: $N_{RB,c} = 106$	100: N _{RB,c} = 66	
DRx Cycle	Corning o	ms	, , , , , , , , , , , , , , , , , , ,	plicable	
DRX Cycle		1115	Νοι Αρ	pilicable	
	Config 1		SR.1.1 FDD	SR3.1 TDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	SR3.1 TDD	
	Config 3		SR2.1 TDD	SR3.1 TDD	
	Config 1		CR.1.1 FDD	CR3.1 TDD	
CORESET Reference Channel	Config 2		CR.1.1 TDD	CR3.1 TDD	
	Config 3		CR2.1 TDD	CR3.1 TDD	
OCNG Patterns			OCNG p	pattern 1	
CCD configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2	
SSB configuration	Config 3		SSB.2 FR1	SSB.1 FR2	
000 " "	Config 1,2		SSB.1 FR1	SSB.1 FR2	
SSB configuration	Config 3		SSB.2 FR1	SSB.1 FR2	
	Config 1,2		SMTC.1	SMTC.1	
SMTC configuration	Config 3		SMTC.2	SMTC.1	
PDSCH/PDCCH	Config 1,2		15 kHz	120 kHz	
subcarrier spacing	Config 3	kHz	30 kHz	120 kHz	
PUCCH/PUSCH	Config 1,2		15 kHz	120 kHz	
subcarrier spacing	Config 3	kHz	30 kHz	120 kHz	
PRACH configuration	<u> </u>		FR1 PRACH configuration	FR2 PRACH configuration	
TRS configuration	Config 1		1 TRS.1.1 FDD	1 TRS.2.1 TDD	
9	Config 2]	TRS.1.1 TDD	TRS.2.1 TDD	
TOI # #	Config 3		TRS.1.2 TDD	TRS.2.1 TDD	
TCI configuration	Trustes even		N/A	CSI-RS.Config.0	
BWP configuration	Initial DL BWP		DLBWP.0.1	DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	DLBWP.1.1	
	Initial UL BWP		ULBWP.0.1	ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	ULBWP.1.1	
EPRE ratio of PSS to SS EPRE ratio of PBCH DM		dB	0	0	

EPRE ratio	o of PBCH to PBCH DMRS o of PDCCH DMRS to SSS o of PDCCH to PDCCH DMRS				
	o of PDSCH DMRS to SSS				
	o of PDSCH to PDSCH				
EPRE ratio	of OCNG DMRS to SSS(Note 1)				
EPRE ration	o of OCNG to OCNG DMRS (Note				
$N_{oc}^{ m Note2}$		dBm/15kH z		-10	4.7
Note2	Config 1,2			-95.7	
N oc Note2	Config 3	dBm/SCS	NA	-95.7	
\hat{E}_s/I_{ot}		dB	Link only, see clause	-Infinity	10
\hat{E}_{s}/N_{oc}		dB	A.3.7A	-Infinity	10
IoNote3	Config 1,2	dBm/ BW		-66.7	-55.4
10	Config 3	dBm/ BW		-66.7	-55.4
Propagation	on condition	-		AW	GN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than [562] ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = [10] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [552]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.5.2.

This gives a total of [562] ms.

A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Pa	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random
				access procedure.
Time offset betwe	en cells		3 µs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Dava	Parameter		Се	ell 1	Cel	1 2
Para	imeter	Unit	T1	T2	T1	T2
NR RF Channel Num	ber			1	1	
Duplex mode			TDD			
TDD configuration				TDDC	onf.3.1	
BW _{channel}		MHz		100: N _F	RB,c = 66	
BWP BW		MHz		100: N _F	RB,c = 66	
DRx Cycle		ms		Not Ap	plicable	
PDSCH Reference m	easurement channel			SR3.1	I TDD	
CORESET Reference	e Channel			CR3.	1 TDD	
OCNG Patterns			OCNG pattern 1			
SMTC Configuration	SMTC Configuration		SMTC pattern 1			
SSB Configuration			SSB.1 FR2			
PDSCH/PDCCH subo	carrier spacing	kHz		120	kHz	
PUCCH/PUSCH subo		kHz			kHz	
PRACH configuration				FR2 PRACH	configuration 1	
TRS configuration				TRS.2	.1 TDD	
TCI configuration				CSI-RS.	Config.0	
BWP configuraiton	Initial DL BWP			DLBV	/P.0.1	
	Dedicated DL BWP			DLBW	/P.1.1	
Initial UL BWP				ULBW	/P.0.1	
	Dedicated UL BWP			ULBV	/P.1.1	
EPRE ratio of PSS to	SSS					
EPRE ratio of PBCH I	DMRS to SSS	dB		0	_	
EPRE ratio of PBCH t	to PBCH DMRS	l an	·	0	0	
EPRE ratio of PDCCH	I DMRS to SSS					

EPRE ratio	o of PDCCH to PDCCH DMRS					
EPRE ratio	o of PDSCH DMRS to SSS					
EPRE ratio	o of PDSCH to PDSCH					
EPRE ratio	o of OCNG DMRS to SSS(Note 1)					
EPRE ratio	o of OCNG to OCNG DMRS (Note					
1)						
N oc Note2		dBm/15kH	-10	4.7	-10	4.7
oc oc	,	Z				
	Config 1,2		-95.7		-95.7	
N oc Note2		dBm/SCS				
oc oc	Config 3		-98	5.7	-95.7	
\hat{E}_s/I_{ot}		dB	6	-1.8	-Infinity	0
\hat{E}_{s}/N_{oc}		dB	6	6	-Infinity	7
Io ^{Note3}	Config 1,2	dBm/ BW	-59.7	-56.7	-59.7	-56.7
10.12.00	Config 3	dBm/ BW	-59.7	-56.7	-59.7	-56.7
Propagation	on condition	-		AW	'GN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{mod} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 222 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 212$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 222 ms.

A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	[-120]	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

Parameter		Unit	Cell 1		Cell 2			
Parameter		Unit	T1 T2		T1	T2		
NR RF Channel Number			1	1 2				
Duplex mode				TDD				
TDD configuration				TDDC				
BW _{channel}		MHz		100: N _R				
BWP BW		MHz		100: N _{RB,c} = 66				
DRx Cycle		ms		Not Applicable				
PDSCH Reference me	easurement channel			SR3.1	TDD			
CORESET Reference	Channel			CR3.1 TDD				
OCNG Patterns				OCNG pattern 1				
SMTC Configuration				SMTC pattern 1				
SSB Configuration				SSB.1 FR2				
PDSCH/PDCCH subc	arrier spacing	kHz		120 kHz				
PUCCH/PUSCH subc		kHz	120 kHz					
PRACH configuration			FR2 PRACH configuration 1					
TRS configuration			TRS.2.1 TDD					
TCI configuration			CSI-RS.Config.0					
BWP configuration	Initial DL BWP			DLBWP.0.1				
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP			ULBWP.1.1				
EPRE ratio of PSS to								
EPRE ratio of PBCH [
EPRE ratio of PBCH t								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS		dB		0				
EPRE ratio of PDSCH DMRS to SSS		ű. <u>-</u>						
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
	EPRE ratio of OCNG to OCNG DMRS (Note							
1)								

N oc Note2		dBm/15kH z	-104.7		-104.7	
N oc Note2	Config 1,2	dDm/CCC	-98	5.7	-95.7	
	Config 3	dBm/SCS	-95.7		-95.7	
\hat{E}_s/I_{ot}	\hat{E}_s/I_{ot}		5	5	-Infinity	5
\hat{E}_{s}/N_{oc}	\hat{E}_{s}/N_{oc}		5	5	-Infinity	5
Io ^{Note3}	Config 1,2	dBm/ BW	-60.5	-60.5	-66.7	-60.5
	Config 3	dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		-	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 542 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 532$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 542 ms.

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial Active cell			1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell	1 Cell2			
RF Chann	el Number		1	1	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	
SMTC configuration			1	SMTC pattern 1	
DRX cycle length		s	1	OFF	
PRACH configuration index			1	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	T1		1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		S	1	3	

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1		Cell 2			
		configuration	T1	T2	Т3	T1	T2	T3
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC		1	SR.3.1 TDD			N/A		
configuration						1		
RMSI CORESET		1	C	R.3.1 TDD)	CR.3.1 TDD		
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 TDI)	CCR.3.1 TDD		
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
PDSCH/PDCCH TCI		1	٦	CI.State.2			N/A	
state								
OCNG Pattern		1		lefined in A	3.2.1	OP.1 defined in A.3.2.1		
Initial DL BWP		1	DLBWP.0.1			DLBWP.0.1		
configuration								
Initial UL BWP		1	ULBWP.0.1		ULBWP.0.1			
configuration								
RLM-RS		1		SSB		SSB		
AoA setup		1	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1			
\hat{E}_{s}/I_{ot}	dB	1	-3.07	-infinity	-infinity	-5.07	2	2
N_{oc} Note2	dBm/15 kHz	1	-98					
N_{oc} Note2	dBm/SCS	1	-89					
\hat{E}_s/N_{oc}	dB	1	4	-infinity	-infinity	2	2	2
SS-RSRP Note3	dBm/SCS	1	-85	-infinity	-infinity	-87	-87	-87
lo	dBm/95.04 MHz	1	-52.94	-55.89	-55.89	-52.94	-55.89	-55.89
Propagation		1	AWGN					
Condition								

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $\frac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_delay} = T_{UL_grant} + T_{UE_re-establish_delay}$$
.

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 1600 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

	Parameter		Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1, 2	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	
_			1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
	nfiguration index		1	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1	5	
T2		ms	1	1600	Time for the UE to detect RLF
T3		S	1	6	

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1 T2 T3		T1	T2	T3	
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC		1	S	R.3.1 TDD)		N/A	
configuration								
RMSI CORESET		1	C	R.3.1 TDD)		R.3.1 TDE)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 TDI)	C	CR.3.1 TD	D
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
PDSCH/PDCCH TCI		1	7	CI.State.2			N/A	
state								
OCNG Pattern		1		lefined in A	3.2.1	OP.1 defined in A.3.2.1		
Initial DL BWP		1		LBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1	ULBWP.0.1		l	JLBWP.0.1		
configuration								
RLM-RS		1		SSB			SSB	
AoA setup		1		defined in A		Setup 3 defined in A.3.15.3		
\hat{E}_{s}/I_{ot}	dB	1	5	-infinity	-infinity	-infinity	-infinity	8
N_{oc} Note2	dBm/15 kHz	1	-98					
N_{oc} Note2	dBm/SCS	1	-89					
\hat{E}_s/N_{oc}	dB	1	5 -infinity -infinity -i		-infinity	-infinity	8	
SS-RSRP Note3	dBm/SCS	1					-81	
lo	dBm/95.04 MHz	1	-53.82 -infinity -infinity -infinity -infinity -51.37					-51.37
Propagation		1	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $\frac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_delay} = T_{UL_grant} + T_{UE_re-establish_delay}$$
.

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify_intra_NR} = 1600 \text{ ms}$

 $T_{identify\ inter\ NR} = 2080\ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment	
Initial	Active cell		1	Cell1		
condition	Neighbour cells		1	Cell2		
Final condition	Active cell		1	Cell2		
RF Chann	el Number		1	1		
Time offse	t between cells		1	3 μs	Synchronous cells	
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers	
N311	N311		1	1	Minimum consecutive in-sync indication from lower layers	
T310		ms		6000	Radio link failure timer configured by RLF-TimersAndConstants	
T311	T311		1	5000	RRC re-establishment timer	
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.	
SSB config	guration		1	SSB.1 FR2	•	
SMTC con			1	SMTC pattern 1		
DRX cycle length		S	1	OFF		
	onfiguration index	index 1 190		The detailed configuration is specified in TS 38.211 clause 6.3.3.2		
T1	T1		1	5		
T2		S	1	6	Time for the UE to detect RLF	
T3	T3		1	5		

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1 Cell 2					
		configuration	T1 T2 T3		T1	T2	T3	
TDD configuration		1	Т	DDConf.3.	1	Т	TDDConf.3.1	
-		1	S	R.3.1 TDD)		N/A	
RMSI CORESET		1	C	R.3.1 FDD)	(CR.3.1 FDE)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 FDI	D	С	CR.3.1 FD	D
RMC configuration								
TRS configuration		1	TI	RS.2.1 TDI)		N/A	
TCI state		1	CS	I-RS.Config	g.0		N/A	
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 c	defined in A	1.3.2.1
Initial DL BWP		1	DLBWP.0.1				DLBWP.0.1	
configuration						ı		
Initial UL BWP		1	ULBWP.0.1			ULBWP.0.1		
configuration								
RLM-RS		1	SSB SSB					
AoA setup		1	Setup 1	defined in A	4.3.15.1	Setup 1	defined in	A.3.15.1
\hat{E}_s/I_{ot}	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
N_{oc} Note2	dBm/SCS	1	-98					
N_{oc} Note2	dBm/15 kHz	1	-89					
\hat{E}_s/N_{oc}	dB	1	5 -infinity -infinity		-infinity	-infinity	5	
SS-RSRP Note3	dBm/SCS	1	-93 -infinity -infinity -infinity -infini		-infinity	-93		
lo	dBm/95.04 MHz	1					-62.82	
Propagation		1	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for ${}^{IV}_{oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 3520 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.2 Random Access

A.7.3.2.2.1 Contention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capble of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for **NR Standalone**

Paramet	er	Unit	Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	As defined in A.3.10, except for for number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per SS	-burst		2	Different from the definition in A.3.10
SS/PBCH block index			0,1	Different from the definition in A.3.10
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 2	Config 1,2		SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SS	S	dB		
EPRE ratio of PBCH_DN	EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS		dB		
EPRE ratio of PDCCH_DMRS to SSS		dB	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_DMRS to SSS		dB		
EPRE ratio of PDSCH to	PDSCH_DMRS	dB		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

	Parameter	Unit	Test-1	Comments
AoA setup			Setup 2b	As defined in A.3.15.2.2.
SSB with index 0	SSB_RP	dB	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp- ThresholdSSB
SSB with index 1	SSB_RP	dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-ThresholdSSB</i>
Configured (UE transmitted power (dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.
PRACH Cor	nfiguration		FR2 PRACH configuration 1	As defined in A.3.8.3.
preambleRe	eceivedTargetPower	dBm	-60	
Propagation	Condition	-	AWGN	
	lo articial noise is applied in the	nis test.	7,000	I

Note 2: void.

A.7.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capble of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

SSB Configuration Config 1,2 SSB pattern 1 in FR2 SSB pattern 1 in FR2 As defined in A.3.10, except of Number of SSBs per SS-burst and SS/PBCH block index as below Number of SSBs per SS-burst 2 2 Different from the definition in A.3.10 SS/PBCH block index 0,1 0,1 Different from the definition in A.3.10 SS/PBCH block index 0,1 0,1 Different from the definition in A.3.10 SS/PBCH block index 0,1 Different from the definition in A.3.10 As defined in A.3.1.4 TDD TDD CSI-RS Config 1,2 TDD TDD TDD Cell 2 TDD Configuration Config 1,2 TDD TDD Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 DCOnf.3.1 OCNG Pattern Note 1 OCNG pattern 1 As defined in A.3.2.1. PDSCH Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.1.1. PDSCH SR3.X TDD SR3.X TDD As defined in A.3.1.1. PASCH Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.1.1. EPRE ratio of PSC to SSS dB EPRE ratio of PBCH_DMRS to SSS dB EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to BSS EPRE ratio of PDCCH_DMRS to BSS EPRE ratio of PDSCH_DMRS SCH_DMRS EPRE ratio of PDSCH to BBSCH_DMRS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH to BBSCH_DMRS EPRE ratio of PDSCH to BBSCH_DMRS EPRE ratio of PDSCH_DMRS EPR	000 0 11 11			000	000 1	
SSBs per SS-burst and SS/PBCH block index as below	SSB Configuration	Config 1,2				
Number of SSBs per SS-burst 2 2 Different from the definition in A.3.10 SS/PBCH block index 0,1 0,1 Different from the definition in A.3.10 CSI-RS Config 1,2 N/A CSI-RS.3.1 As defined in A.3.1.4 Configuration Duplex Mode for Config 1,2 TDD TDD Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1 OCNG Pattern Note 1 OCNG pattern 1 OCNG pattern As defined in A.3.2.1. PDSCH Config 1,2 SR3.X TDD SR3.X TDD SR3.X TDD As defined in A.3.1.1. PDSCH SR Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.1.1. PDSCH SR Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.1.1. PEPRE ratio of PSS to SSS BEPRE ratio of PBCH DMRS to SSS BEPRE ratio of PBCH DMRS to SSS BEPRE ratio of PDCCH_DMRS to BSS EPRE ratio of PDCCH_DMRS to BSS BEPRE ratio of PDCCH_DMRS to BSS EPRE ratio of PDCCH_DMRS to BSS BEPRE ratio of PDCCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS BEPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS BEPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BSS EPRE ratio of PDSCH_DMRS to BBS				FR2	in FR2	
Number of SSBs per SS-burst 2 2 2 Different from the definition in A.3.10 SS/PBCH block index 0,1 0,1 Different from the definition in A.3.10 CSI-RS Config 1,2 N/A CSI-RS.3.1 As defined in A.3.1.4 Configuration Duplex Mode for Config 1,2 TDD TDD Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1 OCNG Pattern Note 1 OCNG pattern OCNG pattern 1 OCNG pattern 1 As defined in A.3.2.1. PDSCH Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.2.1. PDSCH SR3.X TDD SR3.X TDD SR3.X TDD As defined in A.3.1.1. PEPE ratio of PSC box SSS BEPRE ratio of PBCH DMRS to SSS BEPRE ratio of PBCH DMRS to SSS BEPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS						
Number of SSBs per SS-burst SS/PBCH block index 0,1 O,1 O,1 Different from the definition in A.3.10 SS/PBCH block index 0,1 O,1 Different from the definition in A.3.10 CSI-RS Config 1,2 Config 1,2 Configuration Duplex Mode for Config 1,2 Cell 2 TDD TDD TDD TDD TDD TDD TDD TD						and SS/PBCH block
SS/PBCH block index O,1 O,1 Different from the definition in A.3.10 CSI-RS Config 1,2 Configuration Duplex Mode for Config 1,2 TDD TDD TDD TDD TDD TDD TDD TDD TDD TD						index as below
SS/PBCH block index CSI-RS Configuration Duplex Mode for Config 1,2 Cell 2 TDD TDD CCNG pattern Note 1 DCNG pattern 1 CONFiguration DCNG pattern 1 CONG	Number of SSBs per	SS-burst		2	2	Different from the
CSI-RS						definition in A.3.10
CSI-RS	SS/PBCH block inde	Х		0,1	0,1	Different from the
Configuration				·		definition in A.3.10
Duplex Mode for Cell 2 TDD Configuration Config 1,2 TDD Configuration Config 1,2 TDD Configuration Config 1,2 TDD Configuration Config 1,2 TDDConf.3.1 OCNG Pattern 1 OCNG pattern 1 PDSCH Config 1,2 PDSCH SR3.X TDD SR3.X TDD SR3.X TDD As defined in A.3.2.1. PRET Config 1,2 PRET Config	CSI-RS	Config 1,2		N/A	CSI-RS.3.1	As defined in A.3.1.4
Duplex Mode for Cell 2 TDD Configuration Config 1,2 TDD Configuration Config 1,2 TDD Configuration Config 1,2 TDDConf.3.1 OCNG Pattern Note 1 OCNG pattern 1 OCNG pattern 1 PDSCH	Configuration				TDD	
Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1		Config 1,2		TDD	TDD	
OCNG Pattern Note 1 PDSCH parameters Note 2 NR RF Channel Number EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDSCH_DMRS S						
OCNG Pattern Note 1 PDSCH parameters Note 2 NR RF Channel Number EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDSCH_DMRS S	TDD Configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1	
PDSCH Config 1,2 SR3.X TDD SR3.X TDD As defined in A.3.1.1. NR RF Channel Number 1 1 EPRE ratio of PSS to SSS dB EPRE ratio of PBCH_DMRS to SSS dB EPRE ratio of PBCH to dB SSS DEPRE ratio of PDCCH to DMRS EPRE ratio of PDCCH to DMRS EPRE ratio of PDCCH to DMRS EPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB SSS DEPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB SSS DEPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB EPRE ratio of PDSCH_DMRS to dB				OCNG pattern 1	OCNG pattern	As defined in A.3.2.1.
parameters Note 2 NR RF Channel Number EPRE ratio of PSS to SSS BEPRE ratio of PBCH_DMRS to SSS BEPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH to BEPRE ratio				· ·	1	
Parameters Note 2 NR RF Channel Number EPRE ratio of PSS to SSS BEPRE ratio of PBCH_DMRS to SSS BEPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH_DMRS to BEPRE ratio of PDSCH to BEPRE ratio	PDSCH	Config 1,2		SR3.X TDD	SR3.X TDD	As defined in A.3.1.1.
EPRE ratio of PSS to SSS	parameters Note 2					
EPRE ratio of PBCH_DMRS to SSS	NR RF Channel Num	nber		1	1	
EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to BPRE ratio of PDSCH to BPRE ratio of PDSCH to BPRE ratio of PDSCH to BRE RETAINS TO BE RETAI	EPRE ratio of PSS to	SSS	dB			
PBCH_DMRS EPRE ratio of PDCCH_DMRS to dB SSS EPRE ratio of PDCCH to dB PDCCH_DMRS EPRE ratio of PDSCH_DMRS to dB SSS EPRE ratio of PDSCH to dB	EPRE ratio of PBCH	_DMRS to SSS	dB			
EPRE ratio of PDCCH_DMRS to dB SSS 0 0 0 EPRE ratio of PDCCH to dB PDCCH_DMRS EPRE ratio of PDSCH_DMRS to dB SSS EPRE ratio of PDSCH to dB	EPRE ratio of PBCH	to	dB			
SSS	PBCH_DMRS					
EPRE ratio of PDCCH to dB PDCCH_DMRS EPRE ratio of PDSCH_DMRS to dB SSS EPRE ratio of PDSCH to dB	EPRE ratio of PDCC	H_DMRS to	dB			
EPRE ratio of PDCCH to dB PDCCH_DMRS EPRE ratio of PDSCH_DMRS to dB SSS EPRE ratio of PDSCH to dB	SSS			0	0	
EPRE ratio of PDSCH_DMRS to dB SSS EPRE ratio of PDSCH to dB	EPRE ratio of PDCCH to		dB]	U	
SSS EPRE ratio of PDSCH to dB	PDCCH_DMRS					
EPRE ratio of PDSCH to dB	EPRE ratio of PDSCH_DMRS to		dB			
	SSS					
DDCCH DMDC	EPRE ratio of PDSC	H to	dB			
LD2CH_DMK2	PDSCH_DMRS					

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone

Par	rameter	Unit	Test-1	Test-2	Comments
AoA setup			Setup 2b	Setup 2b	As defined in A.3.15.2.2.
SSB with index 0	SSB_RP	dB	[10] dB larger than SSB_RP for SSB index 1	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp-ThresholdSSB
SSB with index 1	SSB_RP	dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured rsrp-ThresholdSSB
Configured U power ($P_{\rm CMAX}$	E transmitted	dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.
PRACH Conf	figuration	-	FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3.
preambleRed er	ceivedTargetPow	dBm	-60	-60	
Propagation (Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring In	formation	-	Not Sent	No additional delays in random access procedure.
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	3.2	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Ce	II 1	Cell 2	
Parameter	Offic	T1	T2	T1	T2
NR RF Channel Number		1			2
Duplex mode			TD	DD	
TDD configuration			TDDC	onf.3.1	
BW _{channel}	MHz		100: N _R	B,c = 66	
BWP BW	MHz		100: N _R	$_{\rm B,c} = 66$	
DRx Cycle	ms	Not Applicable			
PDSCH Reference measurement channel		SR3.1 TDD			
CORESET Reference Channel		CR3.1 TDD			
OCNG Patterns		OCNG pattern 1			
SMTC configuration		SMTC.1 FR2			
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz			
PRACH configuration		FR2 PRACH configuration 1			
TRS configuration		TRS.2.1 TDD			
TCI configuration			CSI-RS.	Config.0	

BWP conf	iguraiton	Initial DL BWP			DLBW	/P.0.1	
	Dedicated DL BWP			DLBWP.1.1			
	Initial UL BWP			ULBWP.0.1			
		Dedicated UL BWP			ULBW	/P.1.1	
EPRE ratio	o of PSS to	SSS					
EPRE ratio	o of PBCH [OMRS to SSS					
EPRE ratio	of PBCH t	o PBCH DMRS					
EPRE ratio	of PDCCH	I DMRS to SSS					
EPRE ratio	of PDCCH	to PDCCH DMRS	dB	,	0	,	1
EPRE ratio	o of PDSCH	DMRS to SSS	uБ	0		0	
	o of PDSCH						
EPRE ratio	o of OCNG	DMRS to SSS(Note 1)					
EPRE ratio	EPRE ratio of OCNG to OCNG DMRS (Note						
1)							
N_{oc} Note2	N Note2		dBm/15kH	-104.7		-104.7	
1 voc	T		Z				
N_{oc} Note2	Config 1,2	2	dBm/SCS	-95.7 -95.7		-95.7	
1 Voc	Config 3		dBIII/3C3			-95.7	
$\hat{\mathbf{E}}_{\!\scriptscriptstyle{\mathrm{s}}}/\mathbf{I}_{\!\scriptscriptstyle{\mathrm{ot}}}$			dB	5	5	-Infinity	5
\hat{E}_s/N_{oc}			dB	5	5	-Infinity	5
IoNote3	Config 1,2	2	dBm/ BW	-60.5	-60.5	-66.7	-60.5
IOnoico	Config 3		dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation	on condition		-	AWGN			
Note 1:	OCNG sha	Il be used such that both	cells are fully a	allocated and	a constant total	transmitted po	wer spectral
		chieved for all OFDM sy				·	•

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $\,N_{oc}\,$ to be fulfilled.

lo levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.2.3.1.3 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

The redirection delay can be expressed as:

 $T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify\text{-}NR} + T_{SI\text{-}NR} + T_{RACH},$

where:

 $T_{RRC_procedure_delay} = 110$ ms and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = 1760 \text{ ms in the test.}$

T_{SI-NR} = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 10$ ms in the test.

This gives a total of 3160 ms.

A.7.4 Timing

A.7.4.1 UE transmit timing

A.7.4.1.1 NR UE Transmit Timing Test for FR2

A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1: Supported test configurations for FR2 PCell

Configuration	Description
1	NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1	Freq1	Freq1
TDD configuration		1	TDDConf.1.2	
BWchannel	MHz	1	100: N _{RB,c} = 66	
Initial BWP Configuration		1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1	DLBWP.1.1 ULBWP.1.1	
TRS Configuration		1	TRS.2.1 TDD	
TCI State		1	CSI-RS.Config.0	
DRx Cycle	ms	1	N/A	DRX.5 ^{Note5}
PDSCH Reference measurement channel		1	SR.3.1 TDD	
RMSI CORESET Reference Channel		1	CR.3.1 TDD	
Dedicated CORESET Reference Channel		1	CCR.3.1 TDD	
OCNG Patterns		1	OP.1	

SSB Configuration		1	SSB.2 FR2	
SMTC Configuration		1	SMTC.1	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS	dB	1	0	0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation condition		1	AWGN	
SRS Config		1	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm oc}$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: DRx related parameters are given in Table A.3.3.5-1
- Note 6: SRS configs are given in Table A.7.4.1.1.1-3

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		According to o	lause A.3.15.1
N _{oc} Note1 dBm/15kHz ^{Note4}		-1	12
N _{oc} Note1	dBm/SCS ^{Note3}	-103	
\hat{E}_s/N_{oc}	dB	4	
SS-RSRP ^{Note2}	dBm/SCS Note4	-!	99
\hat{E}_s/I_{ot}	dB		4
lo ^{Note2}	dBm/95.04 MHz Note4	dBm/95.04 MHz ^{Note4} -68.5	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Table A.7.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

Field SRSConf.1 SRSConf.2

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches N _{RB,c}
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl2560, 0	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.7.4.1.1.1-4: Void

A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test:

- 1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
240	+8*64T _c	+4*64T _c	

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c \pm T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX confiured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.7.4.2 UE timer accuracy

A.7.4.3 Timing advance

A.7.4.3.1 SA FR2 timing advance adjustment accuracy

A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new} = N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS N _{TA_new} = N _{TA_old} + 1024*T _c (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1		
Farameter	Unit	T1	T2	

Note 5:

Duplex mode		TDD			
TDD configuration		TDDConf.3.1			
BWchannel	MHz	$100: N_{RB,c} = 66$			
BWP BW	MHz	$100: N_{RB,c} = 66$			
DRx Cycle	ms	Not Applicable			
PDSCH Reference measurement channel		SR.3.1 TDD			
CORESET Reference Channel		CR.3.1 TDD			
OCNG Patterns		OCNG pattern 1			
TRS configuration		TRS.2.1 TDD			
TCI configuration		CSI-RS.Config.0			
SMTC configuration		SMTC.1 FR2			
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz			
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz			
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS	dB	0			
EPRE ratio of PDSCH DMRS to SSS	uБ				
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note					
1)					
Propagation condition	-	AWGN			
		allocated and a constant total transmitted power spectral			
density is achieved for all OFDM syr					
Note 2: Interference from other cells and no	ise sources no	ot specified in the test is assumed to be constant over			
subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					
Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					
Note 4: Equivalent power received by an an	tenna with 0 d	IBi gain at the centre of the quiet zone			
Note 5. As absorted with 0 dDi gain autono		•			

Table A.7.4.3.1.2-3A: OTA related test parameters

As observed with 0 dBi gain antenna at the centre of the quiet zone

	Parameter	Unit	Te	est 1	
			T1	T2	
Angle of	arrival configuration		According to	clause A.3.15.1	
N_{oc} Note1	ı	dBm/15kHz ^{Note4}	-112		
N_{oc} Note1	I	dBm/SCS ^{Note3}	-	103	
\hat{E}_s/N_{oc}		dB	4		
SS-RSRI	DNote2	dBm/SCS Note4		-99	
$\hat{E}_{_{\!s}}/I_{_{\!ot}}$		dB		4	
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-(68.5	
Note 1:		er cells and noise sources ne rriers and time and shall be n	•		
	for N_{oc} to be fulfille	d.			
Note 2:	Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			information	
Note 3:					
Note 4: Note 5:	Equivalent power red	ceived by an antenna with 0d Bi gain antenna at the centre		of the quiet zone	

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	Fraguency hopping is dischlad
b-SRS	0	Frequency hopping is disabled
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting. SRS on last
nrofSymbols	n1	symbol of slot, and 1symbols for SRS
repetitionFactor	n1	without repetition.
combOffset-n2	0	transmissionComb sotting
cyclicShift-n2	0	transmissionComb setting
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see cla	use 6.3.2 in TS 38	.331 [2].

A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=11.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.7.5 Signaling characteristics

A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

	Parameter		Unit	Value	
				Test 1	
Active PCell	Active PCell			Cell 1	
	RF Channel Number			1	
Duplex mode		Config 1		TDD	
BW _{channel}		Config 1		100: N _{RB,c} = 66	
DL initial BWP of	configuration	Config 1		DLBWP.0.1	
	WP configuration	Config 1		DLBWP.1.1	
UL initial BWP of		Config 1		ULBWP.0.1	
	WP configuration	Config 1		ULBWP.1.1	
TDD Configurat	ion	Config 1		TDDConf.3.1	
CORESET Refe		Config 1		CR.3.1 TDD	
SSB Configurati		Config 1		SSB.1 FR2	
SMTC Configura		Config 1		SMTC.1	
PDSCH/PDCCH		Config 1		120 KHz	
spacing		3			
PRACH Configu	ıration	Config 1		Table A.3.8.3.4	
	ned as RLM RS	Config 1		0,1	
OCNG paramet		<u> </u>		OP.2	
CP length				Normal	
Correlation Mati	rix and Antenna Co	onfiguration		2x2 Low	
Out of sync	DCI format			1-0	
transmission	Number of Con	trol OFDM symbols		2	
parameters	Aggregation lev	el	CCE	8	
	Ratio of hypothe	etical PDCCH RE	dB	4	
	energy to avera	ge SSS RE energy			
	Ratio of hypothe	etical PDCCH DMRS	dB	4	
		ge SSS RE energy			
	DMRS precode			REG bundle size	
	REG bundle siz	е		6	
DRX				OFF	
Gap pattern ID				gp0	
Layer 3 filtering				Enabled	
T310 timer			ms	0	
T311 timer			ms	1000	
N310				1	
N311				<u>.</u> 1	
-		Config 1		CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH				TCI.State.2	
		Config 1		TRS.2.1 TDD	
T1	<u> </u>		S	0.2	
T2			S	9.68	
T3			S	9.68	
D1			S	9.64	
		ocianad to the LIE prior t			

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

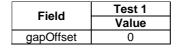
Parar	Unit	Test 1			
			T1	T2	T3
AoA setup			Setur	3 defined in	A.3.15
EPRE ratio of PDCCH DI	MRS to SSS	dB		4	
EPRE ratio of PDCCH to	PDCCH DMRS	dB		0	
EPRE ratio of PBCH DM	RS to SSS	dB			
EPRE ratio of PBCH to P	BCH DMRS	dB			
EPRE ratio of PSS to SS	S	dB			
EPRE ratio of PDSCH DI	MRS to SSS	dB		0	
EPRE ratio of PDSCH to	PDSCH DMRS	dB			
EPRE ratio of OCNG DM	RS to SSS	dB			
EPRE ratio of OCNG to 0	OCNG DMRS	dB			
ssb-Index 0 SNR	Config 1	dB	2	-6	-15
ssb-Index 1 SNR	Config 1		2	-15	-15
SNR on other channels	Config 1	dB		2	
and signals				2	
N_{oc}	Config 1	dBm/15		-92.1dBm	
¹ Voc		KHz		-92. IUDIII	
Propagation condition			DL-A 30ns 75I		
Note 1: OCNG shall be	e used such that the reso	urces in Cell	1 are fully all	ocated and a	constant total
transmitted power spectral density is achieved for all OFDM symbols.					
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG				OCNG.	

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band.

For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode



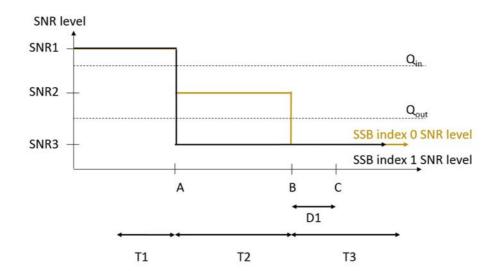


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.2.1-1. The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Parameter			Unit	Value
	Faramete		-	Test 1
Active PCell				Cell 1
RF Channel No	umber	T 0 " 1		1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66 DLBWP.0.1
DL initial BWP DL dedicated B		Config 1 Config 1		DLBWP.0.1 DLBWP.1.1
configuration	5VV F	Corning i		DLBWF.1.1
UL initial BWP	configuration	Config 1		ULBWP.0.1
UL dedicated E		Config 1		ULBWP.1.1
configuration		ŭ		
TDD Configura		Config 1		TDDConf.3.1
CORESET Ref	ference	Config 1		CR.3.1 TDD
Channel		0 " 1		000 4 500
SSB Configura		Config 1		SSB.1 FR2
SMTC Configu PDSCH/PDCC		Config 1 Config 1		SMTC.3 120 KHz
spacing	n subcamer	Coning i		120 KH2
PRACH Config	uration	Config 1		Table A.3.8.3.4
SSB index ass	igned as RLM	Config 1		0,1
RS	J GO . (LIV)			- ,.
OCNG parame	eters	•		OP.2
CP length				Normal
	trix and Antenna	Configuration		2x2 Low
In sync	DCI format			1-0
transmission	Number of Control OFDM symbols			2
parameters	Aggregation le	vel	CCE	4
		netical PDCCH RE	dB	0
	Ratio of hypoth	age SSS RE energy	dB	0
		to average SSS RE	uБ	0
	energy	to avolago coo ItE		
	DMRS precode	er granularity		REG bundle size
	REG bundle si			6
Out of sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE	dB	4
		age SSS RE energy netical PDCCH	dB	4
		to average SSS RE	иь	4
	energy	to avolago coo ItE		
	DMRS precode	er granularity		REG bundle size
	REG bundle si			6
DRX	L KEG Dundle SI	4 6		0FF
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
		mc	4000	
T310 timer T311 timer		ms ms	4000 1000	
N310		1113	1	
N311			1	
CSI-RS for CSI reporting Config 1			CSI-RS.3.1 TDD	
	PDCCH/PDSCH			TCI.State.2
CSI-RS for trac		Config 1		TRS.2.1 TDD
T1			S	0.2
T2	T2		S	0.2

T3		S	1.88	
T4		S	0.2	
T5		S	3.84	
D1		S	3.8	
Note 1:	All configurations are assigned to the UE prior to the start of time period T1.			
Note 2:	UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

	Paran	neter	Unit		Test 1			
		T1	T2	T3	T4	T5		
AoA setu	р			5	Setup 3	defined	in A.3.1	5
EPRE rat	tio of PDCCH	DMRS to SSS	dB			4		
EPRE rat	tio of PDCCH	to PDCCH DMRS	dB			0		
EPRE rat	tio of PBCH D	MRS to SSS	dB					
EPRE rat	tio of PBCH to	PBCH DMRS	dB					
EPRE rat	tio of PSS to	SSS	dB	Į				
EPRE rat	tio of PDSCH	DMRS to SSS	dB			0		
EPRE rat	tio of PDSCH	to PDSCH DMRS	dB	Į				
EPRE rat	tio of OCNG I	DMRS to SSS	dB					
EPRE rat	tio of OCNG t	o OCNG DMRS	dB					
ssb-Index	k 0 SNR	Config 1	dB	2 -6 -15 -4.5			2	
ssb-Index	x 1 SNR	Config 1		2 -15 -15		-15	-15	-15
SNR on o		Config 1	dB			2		
channels	and signals							
N_{oc}		Config 1	dBm/1 5KHz		ę	92.1dBn	n	
Propagat	ion condition				TDL-	A 30ns	75Hz	
Note 1:		l be used such that the	resource	es in Ce	ell 1 are	fully allo	cated a	nd a
	constant tot	al transmitted power s	pectral de	ensity is	achieve	ed for al	I OFDM	
	symbols.							
Note 2:						art of		
	OCNG.							
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.								
Note 4:	3							
		or testing of a UE whi	ch suppoi	rts 4RX	on all b	ands, th	e SNR	during
	T3 is A.3.6.							

Table A.7.5.1.2.1-4: Void

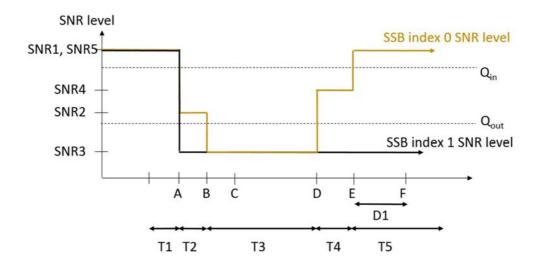


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz		

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Parameter			Unit	Value	
				Test 1	
Active PCell				Cell 1	
RF Channel Nu	ımber			1	
Duplex mode		Config 1		TDD	
BW _{channel}		Config 1		100: N _{RB,c} = 66	
DL initial BWP	configuration	Config 1		DLBWP.0.1	
DL dedicated E		Config 1		DLBWP.1.1	
configuration					
UL initial BWP	configuration	Config 1		ULBWP.0.1	
UL dedicated E	BWP	Config 1		ULBWP.1.1	
configuration		ŭ			
TDD Configura	tion	Config 1		TDDConf.3.1	
CORESET Ref	erence	Config 1		CR.3.1 TDD	
Channel					
SSB Configura	tion	Config 1		SSB.1 FR2	
SMTC Configu	ration	Config 1		SMTC.1	
PDSCH/PDCC		Config 1		120 KHz	
spacing		ŭ			
PRACH Config	uration	Config 1		Table A.3.8.3.4	
SSB index assi		Config 1		0,1	
RS					
OCNG parame	ters			OP.1	
CP length				Normal	
Correlation Ma	trix and Antenna	a Configuration		2x2 Low	
Out of sync	DCI format			1-0	
transmission	Number of Co	ntrol OFDM symbols		2	
parameters	Aggregation le		CCE	8	
		hetical PDCCH RE	dB	4	
		rage SSS RE energy			
		hetical PDCCH	dB	4	
	DMRS energy	to average SSS RE			
	energy	_			
	DMRS precoder granularity			REG bundle size	
	REG bundle s	size		6	
DRX Configura	tion			DRX.3	
Gap pattern ID				N.A.	
Layer 3 filtering	I			Enabled	
T310 timer			ms	0	
T311 timer			ms	1000	
N310				1	
N311				1	
CSI-RS for CSI reporting Config 1				CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2		
CSI-RS for tracking Config 1				TRS.2.1 TDD	
T1			s	0.2	
T2			S	14.48	
T3			S	14.48	
D1			S	14.44	
D1			3 1	17.77	

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
AoA setup		Setup 1 defined in A.3.15			
EPRE ratio of PDCCH DMRS to SSS		dB	4		
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0		
EPRE ratio of PBCH DMR	EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS		dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMRS to SSS		dB		0	
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
ssb-Index 0 SNR	Config 1	dB	2	-6	-15
ssb-Index 1 SNR	Config 1		2	-15	-15
SNR on other channels	Config 1	dB	2		
and signals			2		
N_{oc}	Config 1	dBm/15K	-104.7dBm		
		Hz	-104.7ubiii		
Propagation condition			TDL-A 30ns 75Hz		
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total					

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.3.1-4: Void
Table A.7.5.1.3.1-5: Void

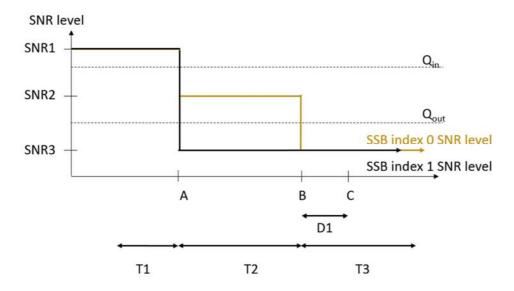


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Editor note: AoA setting needs to be updated.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz		

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Parameter			Unit	Value
A .:				Test 1
Active PCell				Cell 1
RF Channel Number		Config 1		1
	Duplex mode			TDD
BW _{channel}	aanfiauratian	Config 1		100: N _{RB,c} = 66 DLBWP.0.1
DL initial BWP DL dedicated B		Config 1 Config 1		DLBWP.0.1 DLBWP.1.1
configuration	DVVP	Coning i		DLBVVP.1.1
UL initial BWP	configuration	Config 1		ULBWP.0.1
UL dedicated E		Config 1		ULBWP.1.1
configuration	, , , , , , , , , , , , , , , , , , ,	Coming 1		OLDWI III
TDD Configura	tion	Config 1		TDDConf.3.1
CORESET Ref		Config 1		CR.3.1 TDD
Channel				
SSB Configura	tion	Config 1		SSB.1 FR2
SMTC Configu		Config 1		SMTC.3
PDSCH/PDCC		Config 1		120 KHz
spacing				
PRACH Config	uration	Config 1		Table A.3.8.3.4
SSB index ass	igned as RLM	Config 1		0,1
RS				
OCNG parame	ters			OP.1
CP length				Normal
	trix and Antenna	Configuration		2x2 Low
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation level		CCE	4
		etical PDCCH RE	dB	0
	energy to average SSS RE energy		15	
	Ratio of hypothetical PDCCH		dB	0
	DMRS energy to average SSS RE energy			
	DMRS precoder granularity			REG bundle size
				6
Out of sync	REG bundle size DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
pa.aetere	Ratio of hypothetical PDCCH RE		dB	4
	energy to average SSS RE energy		<u> </u>	·
	Ratio of hypothetical PDCCH		dB	4
		to average SSS RE		·
	energy	· ·		
	DMRS precode	er granularity		REG bundle size
	REG bundle size	ze		6
DRX Configuration				DRX.11
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CSI reporting Config 1				CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking Config 1		_	TRS.2.1 TDD	
T1			S	0.2
T2			S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88

D1		S	3.84
Note 1: All configurations are assigned to the UE prior to the start of time period T1.		art of time period T1.	
Note 2:	UE-specific PDCCH is not transmitted after	T1 starts.	

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

Paran	Unit	Test 1					
		T1	T2	Т3	T4	T5	
AoA setup				Setup 1	defined	in A.3.1	5
EPRE ratio of PDCCH D	MRS to SSS	dB			4		
EPRE ratio of PDCCH to	PDCCH DMRS	dB			0		
EPRE ratio of PBCH DM	IRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to SS	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB			0		
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1	dB	2 -6 -15 -4.5 2		2		
ssb-Index 1 SNR	Config 1		2	-15	-15	-15	-15
SNR on other	Config 1	dB			2		
channels and signals							
N_{oc} Config 1		dBm/1 5KHz	-104.7dBm				
Propagation condition				TDL	-A 30ns	75Hz	
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a							
constant total						ools.	
Note 2: The signal contains PDCCH for UEs other than the device under test a OCNG.3				er test as	s part of		
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.							

The SNR values are specified for testing a UE which supports 2RX on at least one Note 4: band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.4.1-4: Void Table A.7.5.1.4.1-5: Void

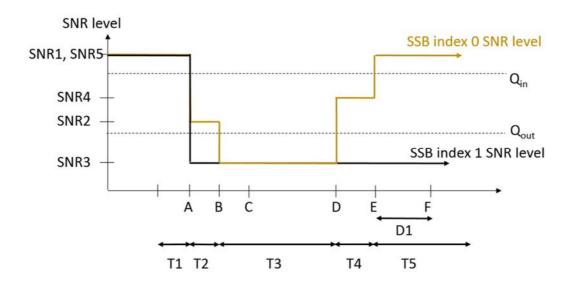


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
CORESET	Config 1		CCR.3.1 TDD
Reference Channel			CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		_
F-0.0	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE	u _D	
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			00.110.011122
T1		S	0.2
T2		S	0.35
T3		s	0.35
D1		s	0.31
	PDCCH is not transmitted after T1 sta		0.01

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Par	ameter	Unit		Test 1				
			T1	T2	T3			
PDCCH_beta		dB	4					
PDCCH_DMRS	S_beta	dB		4				
PBCH_beta		dB						
PSS_beta		dB						
SSS_beta		dB		0				
PDSCH_beta		dB	1					
OCNG_beta		dB	7					
SNR on RLM-RS1	Config 1	dB	2	-6	-15			
SNR on RLM-RS2	Config 1	dB	2	-14	-15			
SNR on other channels and signals	Config 1	dB	2					
N_{oc}	Config 1	dBm/15KHz	TBD					
Propagation co			TDL-C 300ns 100Hz					

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Test 1		
	Field		
	gapOffset	0	
Note 1:	Note 1: RLM RS is partially overla		
	measurement gap		

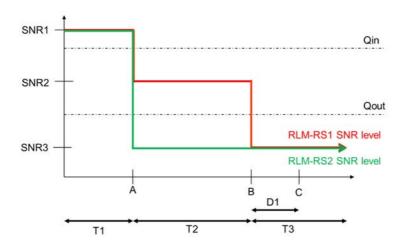


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration UL initial BWP	Config 1		ULBWP.0.1
configuration	Corning 1		OLBVVP.U.1
UL dedicated BWP	Config 1		ULBWP.1.1
configuration	Coming 1		OLDWI .I.I
CORESET	Config 1		CCR.3.1 TDD
Reference Channel	Coming 1		CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	Coming 1		
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
	3		Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for P	DCCH#1/PDSCH		TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
	DCI format		1-0
	Number of Control OFDM		2
Out of sync	symbols		
transmission	Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols	CCE	1
	Aggregation level Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE	UD	
	energy		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS	45	Ĭ
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX	·		OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1

N311			1	
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD	
T1		S	0.2	
T2		S	0.2	
T3		S	0.24	
T4		S	0.2	
T5		S	0.88	
D1		S	0.84	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

P	arameter	Unit			Test 1		
			T1	T2	T3	T4	T5
PDCCH_bet	a	dB	dB 4				
PDCCH_DM	RS_beta	dB			4		
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB	dB 0				
PDSCH_beta	a	dB					
OCNG_beta		dB					
SNR on	Config 1	dB	2	-6	-15	-4.5	2
RLM-RS1							
SNR on	Config 1	dB	2	-14	-15	-15	-14
RLM-RS1							
SNR on	Config 1	dB	2				
RLM-RS1							
N_{oc}	Config 1	dBm/15KHz	TBD				
Propagation	condition			TD	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

 The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 2:
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time
- Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 4:
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 Note 8: respectively in figure A.7.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

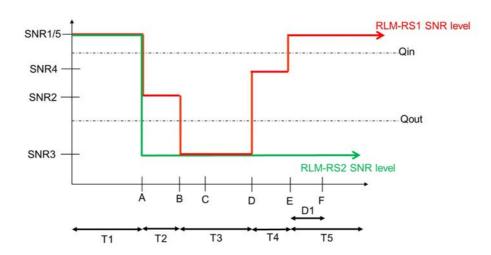


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description	
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth	

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
CORESET	Config 1		CCR.3.1 TDD
Reference Channel			CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		_
F-0.0	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE	u _D	
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		·
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			33. 13.3.1 122
T1		S	0.2
T2		S	1.28
T3		s	1.28
D1		s	1.24
	PDCCH is not transmitted after T1 sta		1.27

Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
PDCCH_beta		dB	4		
PDCCH_DMR	S_beta	dB	4		
PBCH_beta		dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_beta		dB			
OCNG_beta		dB			
SNR on	Config 1	dB	2	-6	-15
RLM-RS1					
SNR on RLM-RS2	Config 1	dB	2	-14	-15
SNR on other channels and signals		dB	2		
N_{oc}	Config 1	dBm/15KHz	-104.7		
Propagation condition				TDL-C 300ns 100Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

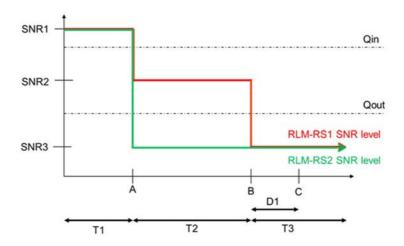


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
	DL initial BWP Config 1		DLBWP.0.1
configuration			
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP	Config 1		ULBWP.0.1
configuration	Coming 1		025777.0.1
UL dedicated BWP	Config 1		ULBWP.1.1
configuration	3		
CORESET	Config 1		CCR.3.1 TDD
Reference Channel			CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	, and the second		
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for P	PDCCH#1/PDSCH		TCI.State.2
TCI configuration for P	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE		
	energy	10	
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS		
	RE energy		REG bundle size
	DMRS precoder granularity REG bundle size		REG bundle size
DRX			DRX.3
Gap pattern ID			*gp0
Layer 3 filtering T310 timer		me	Enabled 2000
		ms me	
T311 timer		ms	1000
N310			1

N311			1	
CSI-RS for CSI Config 1 reporting			CSI-RS.3.1 TDD	
T1		S	0.2	
T2		S	0.2	
T3		S	1.64	
T4		S	0.2	
T5		S	1.88	
D1		S	1.84	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
PDCCH beta dB					4		
PDCCH_DM	IRS_beta	dB			4		
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB			0		
PDSCH_beta	a	dB					
OCNG_beta		dB					
SNR on RLM-RS1	Config 1	dB	2	-6	-15	-4.5	2
SNR on RLM-RS1	Config 1	dB	2	-14	-15	-15	-14
SNR on RLM-RS1	Config 1	dB	2				
N_{oc}	Config 1	dBm/15KHz	-104.7				
Propagation condition				TDI	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field					
	Value					
	gapOffset	0				
Note 1:	RLM RS is partially overlapped with					
	measurement gap					

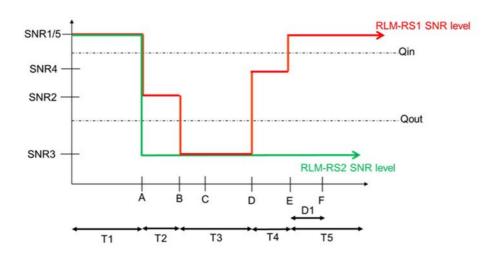


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	
T1	s	1	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Cell 1		
		configuration	AoA1	AoA2	
TDD configuration		1	TDDC	onf.3.1	
PDSCH RMC		1	SR.3.1 TDD	Not sent	
configuration					
RMSI CORESET		1	CR.3.1 TDD	Not sent	
RMC configuration					
Dedicated CORESET		1	CCR.3.2 TDD	Not sent	
RMC configuration					
TRS configuration		1	TRS.2.1 TDD	TRS.2.2 TDD	
PDCCH/PDSCH TCI		1	TCI.State.2	N/A	
state					
OCNG Pattern		1	OP.1 defined in	Not sent	
			A.3.2.1		
Initial DL BWP		1	DLBWP.0.1		
configuration					
Initial UL BWP		1	ULBW	/P.0.1	
configuration					
RLM-RS		1	SSB with index 0	SSB with index 1	
AoA setup		1	Setup 3 define	ed in A.3.15.3	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	3	N/A	
N_{oc} Note2	dBm/SCS	1	-84.9	Not sent	
\hat{E}_s/N_{oc}	dB	1	3	N/A	
SS-RSRP Note3	dBm/SCS	1	-81.9	-81.9	
lo	dBm/95.04 MHz	1	-51.15	-52.91	
Propagation		1	AW	'GN	
Condition					

A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.7.5.2 Interruption

A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description			
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode			

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated		Cell2	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Cell1	Cell2	
Frequency Range		FR2		
Duplex mode		TDD		
TDD configuration		TDDConf.3.1		
BWchannel		100 MHz: N _{RB,c} = 66		
Initial DL BWP			P.O.2 ^{Note4}	
Configuration				
Initial UL BWP		ULBWF	P.0.2 Note6	
Configuration				
Downlink dedicated		DLBV	WP.1.1	
BWP Configuration				
Uplink dedicated		ULBV	WP.1.1	
BWP configuration				
PDSCH Reference		SR.3	.1 TDD	
measurement				
channel				
RMSI CORESET		CR.3	.1 TDD	
parameters				
Dedicated		CCR.3	3.1 TDD	
CORESET				
parameters				
OCNG Patterns		OP.1		
SMTC Configuration			TC.1	
SSB Configuration			.1 FR2	
TCI State		TCI.S	State.0	
TRS Configuration		TRS.2.1 TDD		
Correlation Matrix and Antenr	na	1x2 Low		
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to	o SSS			
EPRE ratio of PBCH to PBCH	1			
DMRS				
EPRE ratio of PDCCH DMRS	to			
SSS				
EPRE ratio of PDCCH to PDC				
DMRS	dB	0	0	
EPRE ratio of PDSCH DMRS	to			
SSS				
EPRE ratio of PDSCH to PDS				
EPRE ratio of OCNG DMRS t	to			
SSS(Note 1)				
EPRE ratio of OCNG to OCN	G			
DMRS (Note 1)				
Time offset to Cell1 Note 3	μs	-	3	
Propagation Condition		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3].

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell 1	Cell 2			
Angle of arrival con	figuration		Setup1 according to table A.3.15.1	Setup 1according to table A.3.15.1			
$N_{_{OC}}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F	dBm/15kHz	-112	-112			
	NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	abilit fold iz	112	112			
N_{oc} Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	- dBm/SCS	-102.97	-102.97			
SS-RSRP ^{Note2}	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	dBm/120KH z ^{Note3}	-85.97	-85.97			
\hat{E}_{s}/N_{oc} \hat{E}_{s}/I_{ot}		dB	17	17			
$\hat{E}_{\scriptscriptstyle s}/I_{\scriptscriptstyle ot}$		dB	17	17			
Io ^{Note2}	NR_TDD_FR2_A NR_TDD_FR2_B		-56.90	-56.90			
constant	nce from other cells and over subcarriers and tim						
00	to be fulfilled.						
purposes	P and lo levels have bee s. They are not settable p	parameters them	selves.				
noise at	P minimum requirements each receiver antenna pont nt power received by an	ort.					
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone							

A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on PCell shall not exceed the value defined in Table A.7.5.2.1.2-1 if the PCell is not in the same band as the deactivated SCell or Table A.7.5.2.1.2-2 if the PCell is in the same band as the deactivated SCell.

As observed with 0 dBi gain antenna at the centre of the quiet zone

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and
			2, respectively.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}	Unit	T1		T2		Т3	
Farameter		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD		TDD	
TDD configuration		TDDC	onf.3.1	TDDConf.3.1		TDDConf.3.1	
Downlink initial BWP Configuration		DLBV	VP.0.1	DLBWP.0.1		DLBWP.0.1	
Downlink dedicated BWP Configuration		DLBV	VP.1.1	DLBV	/P.1.1	DLBWP.1.1	
Uplink initial BWP configuration		ULBV	VP.0.1	ULBV	/P.0.1	ULBW	/P.0.1
Uplink dedicated BWP configuration		ULBV	VP.1.1	ULBV	/P.1.1	ULBW	/P.1.1
TRS configuration		TRS.2	.1 TDD	TRS.2	.1 TDD	TRS.2.	1 TDD
TCI state		TCI.S	state.0	TCI.S	tate.0	TCI.S	tate.0
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,c = 66	100: N _R	$_{\rm B,c} = 66$
PDSCH Reference measurement channel		SR.3.1	_	SR.3.1	_	SR.3.1	_
r DSCIT Reference measurement channel		TDD	-	TDD	_	TDD	-
RMSI CORESET Parameters		CR.3.1	_	CR.3.1	_	CR.3.1	_
TANOI CONECETT didifictors		TDD		TDD		TDD	
Dedicated CORESET Parameters		CCR.3.	_	CCR.3.	_	CCR.3.	_
		1 TDD		1 TDD		1 TDD	
OCNG Patterns				OF			
SSB Configuration					1 FR2		
SMTC Configuration				SM	ГС.1		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS	dB	В		()		
EPRE ratio of PDSCH_DMRS to SSS	uВ	U U					
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG DMRS Note							
1							
Propagation conditions					'GN		-41

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: All parameters apply for configuration 1 and 2

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

ParamotorNote 6	Unit	Cell 1			Cell 2		
Parameter		T1	T2	Т3	T1	T2	T3

Angle of arrival configuration		Setup 1 according to table A.3.15.1	Setup 1 according to table A.3.15.1
N oc Note1	dBm/15kHz ^N	-112	-112
N oc Note1	dBm/SCS ^{Note}	-102.97	-102.97
\hat{E}_s/N_{oc}	dB	14	14
SS-RSRP ^{Note2}	dBm/SCS Note4	-88.97	-88.97
\hat{E}_{s}/I_{ot}	dB	14	14
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-88.80	-88.80

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: All parameters apply for configuration 1 and 2

A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[T_{SMTC\ SCell} + 5ms]$ as defined in clause 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are the same as defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are the same as defined in Table A.7.5.3.2.1-3.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description				
1	PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
2	PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is onl	Note: The UE is only required to pass in one of the supported test configurations				

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

			T1		T2		Т3		
Parame	eter ^{Note 5}	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			Freq1	Freq2	Freq1	Freq2	Freq1	Freq2	
Duplex mode	Config 1		FDD	TDD	FDD	TDD	FDD	TDD	
	Config 2,3			TDD					
TDD configuration	Config 1		Not		Not		Not		
			Applicabl	TDDConf	Applica	TDDCo	Applica	TDDCo	
	0 " 00		e	.3.1	ble	nf.3.1	ble	nf.3.1	
	Config 2,3		TDDConf		TDDCo nf.1.1		TDDCo		
Downlink initial			.1.1				nf.1.1		
BWP Configuration	Config 1,2,3				DLBWP	.0.1			
Downlink dedicated	Confin 4 0 0		DLBWP.1	DLBWP.	DLBW	DLBW	DLBW	DLBW	
BWP Configuration	Config 1,2,3		.1	1.1	P.1.1	P.1.1	P.1.1	P.1.1	
Uplink initial BWP	Config 1,2,3		ULBWP.0	ULBWP.	ULBW	ULBW	ULBW	ULBW	
configuration			.1	0.1	P.0.1	P.0.1	P.0.1	P.0.1	
Uplink dedicated BWP configuration	Config 1,2,3		ULBWP.1	ULBWP. 1.1	ULBW P.1.1	ULBW P.1.1	ULBW P.1.1	ULBW P.1.1	
TRS configuration			.1 N/A	TRS.2.1	N/A	TRS.2.	N/A	TRS.2.	
Tree configuration	Config 1,2,3		14//	TDD	13// (1 TDD	14// (1 TDD	
TCI state	Config 1,2,3		TCI.State.	TCI.Stat	TCI.Sta	TCI.Sta	TCI.Sta	TCI.Sta	
	Corning 1,2,3		0	e.0	te.0	te.0	te.0	te.0	
BW _{channel}	0 " 10	MHz	10: N _{RB,c}		10:		10:		
	Config 1,2		= 52	100:	N _{RB,c} = 52	100:	N _{RB,c} = 52	100:	
			40: N _{RB,c}	N _{RB,c} =	40:	$N_{RB,c} =$	40:	N _{RB,c} =	
	Config 3		= 106	66	$N_{RB,c} =$	66	$N_{RB,c} =$	66	
	J Coming o				106		106		
PDSCH Reference measurement	Config 1		SR.1.1		SR.1.1		SR.1.1		
	Corning 1		FDD		FDD		FDD		
	Config 2		SR.1.1	-	SR.1.1	-	SR.1.1	-	
channel			SR.2.1		TDD SR.2.1		TDD SR.2.1		
	Config 3		TDD		TDD		TDD		
	Config 1		CR.1.1		CR.1.1		CR.1.1		
	Corning 1		FDD		FDD		FDD		
RMSI CORESET	Config 2		CR.1.1	-	CR.1.1	-	CR.1.1	-	
Parameters		_	TDD CR.2.1		TDD CR.2.1		TDD CR.2.1		
	Config 3		TDD		TDD		TDD		
	Config 1		CCR.1.1		CCR.1.		CCR.1.		
Dedicated	Config 1		FDD		1 FDD		1 FDD		
CORESET	Config 2		CCR.1.1	_	CCR.1.	_	CCR.1.	_	
Parameters			TDD		1 TDD		1 TDD		
	Config 3		CCR.2.1 TDD		CCR.2. 1 TDD		CCR.2. 1 TDD		
OCNG Patterns	l		טטו		OP.	<u> </u> 	טטוון	1	
20.101 4.101110	Cartin 4.0		SSB.1		SSB.1		SSB.1		
SSB configuration	Config 1,2		FR1	SSB.3	FR1	SSB.3	FR1	SSB.3	
SSB Configuration	Config 3		SSB.2	FR2	SSB.2	FR2	SSB.2	FR2	
OMTO and firming fi	2311190		FR1		FR1		FR1		
SMTC configuration EPRE ratio of PSS to	\				SMTC	1			
EPRE ratio of PBCH		1							
EPRE ratio of PBCH		†							
EPRE ratio of PDCC		4D			^				
EPRE ratio of PDCCI	H to PDCCH_DMRS	dB			0				
EPRE ratio of PDSCI									
EPRE ratio of PDSCI		1							
EPRE ratio of OCNG	DMRS to SSS ^{Note 1}								

NA Link only, see clause A.3.7A	only, see clause		AWGN	NA Link only, see clause A.3.7A	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.								
	Link only, see clause A.3.7A e fully alloca	Link only, see clause A.3.7A e fully allocated and a c	Link only, see clause A.3.7A AWGN see clause A.3.7A e fully allocated and a constant total	Link only, see clause A.3.7A	Link only, see clause A.3.7A			

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: All parameters apply for configuration 1 and 2

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

Parameter		Unit		Cell 2			Cell 1		
		Offic	T1	T2	T3	T1	T2	T3	
Angle of arrival cor	nfiguration		According to clause A.3.15.1			NA			
N_{oc} Note1		dBm/15kHz		-112					
N_{oc} Note1	Config 1,2 Config 3,	dBm/SCS		-102.97					
SS-RSRP ^{Note2}	Config 1,2 Config 3	dBm/SCS Note3		-85.97		NA .			
\hat{E}_s/N_{oc}	Config 1,2,3	dB		17	Link only, see A.3.7		A.3.7A		
\hat{E}_s/I_{ot}		dB		17					
IoNote2	Config 1,2	dBm/ChBW ^N		-56.90					
10	Config 3	ote4,Note6	-56.90						

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.7.5.3.2.2 Test Requirements

The test requirements defined in clause A.7.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [TBD] as defined in clause 8.3.

A.7.5.4 Viod

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Configur	ation	Description				
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parar	Parameter		Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Nur	nber		1	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP	Config 1, 2		DLBWP.1.1	
configuration				
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP	Config 1, 2		ULBWP.1.1	
configuration	Cartin 4 0		TDDC	
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET Reference Channel	Config 1, 2		CR. 3.1 TDD	

					T.
SSB		Config 1, 2		SSB.1 FR2	
Configu	uration				
SMTC Config 1, 2			SMTC.3		
Configu	uration	G ,			
0019					
PDSCF	I/PDCC	Config 1, 2		120 KHz	
H subc		Coming 1, 2		120 1012	
spacing	spacing				
PRACI		Config 1, 2		Table A.3.8.3.4	
Configu	uration				
SSB in	dex assigr	ned as BFD RS		0	
(q ₀)	_				
(1-7					
SSB in	dex assign	ned as CBD		1	
RS (q ₁)				·	
110 (41)	'				
TCI		Config 1, 2		TBD	
		Corning 1, 2		TBD	
Configu	uration				
00110					
	paramete	rs		OP.1	
CP len				Normal	
Correla	tion Matrix	x and Antenna		2x2 Low	
Configu	uration				
	DCI forn	nat		1-0	
		of Control		2	
Beam				2	
	OFDM s		005		
failur		ation level	CCE	8	
е		hypothetical	dB	0	
detec	PDCCH	RE energy to			
tion	average	CSI-RS RE			
trans	energy				
missi		hypothetical	dB	0	
on			ub	O	
para	PDCCH	DMRS energy			
meter		ge CSI-RS RE			
	energy				
S	DMRS p	recoder		REG bundle size	
	granular	rity			
		ndle size		6	
DRX				OFF	
	## ID				
	ttern ID			gp0	140 0 0 0 111
riminS	/ncOutOfS	SyncThreshold		absent	When the field is
					absent, the UE
					applies the value
					0. (Table 8.1.1-1).
rsrn-Th	rsrp-ThresholdSSB		dBm	TBD	Threshold used
		45/11	. 35	for Q _{out_LR_SSB}	
no:::::::	nowerCentralOffeetCC			dh O	
powerControlOffsetSS			db0	Used for deriving	
					rsrp-
					ThresholdCSI-RS
beamF	ailureInsta	anceMaxCount		n1	see clause 5.17
					of TS 38.321 [7]
beamF	ailureDete	ectionTimer		pbfd4	see clause 5.17
		· · · · · · · · · · · · · · · · · · ·		la ca y and y	of TS 38.321 [7]
L			1		1 01 10 00.021[/]

CSI-RS configuration for CSI reporting	Config 1, 2		[CSI-RS.3.1 TDD]	
TCI states	I -		[TCI.State.0]	
CSI-RS for tracking	Config 1, 2		[TRS.2.1 TDD]	
SSB index assigned a RS	s RLM		0, 1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	2.61	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Editor's note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramet	Unit	Test 1						
			T1	T2	Т3	T4	T5	
EPRE ratio of PDCCH DN	/IRS to SSS	dB				•		
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DMI	RS to SSS	dB						
EPRE ratio of PBCH to P	BCH DMRS	dB						
EPRE ratio of PSS to SS	3	dB	0					
EPRE ratio of PDSCH DN	EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to	PDSCH DMRS	dB						
EPRE ratio of OCNG DM	RS to SSS	dB						
EPRE ratio of OCNG to C	CNG DMRS	dB						
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12	
Config 2		uБ	5	-3	-12	-12	-12	
SNR SSB of set q ₁		dB	-12	-12	5	5	5	
Config 2		uБ	-12	-12	5	5	5	
N/ Config 1		dBm/12			TBD			
TV _{oc}	Config 2	0 KHz			TBD			

Propagat	Propagation condition		TDL-A 30ns 75Hz		
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total				
	transmitted power spectral density	is achieve	ed for all OFDM symbols.		
Note 2:	The uplink resources for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configu	ration for C	SI reporting are assigned to the UE prior to the start		
	of time period T1.				
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.				
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period				
	T1.				
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.				
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.				
Note 8:	The SNR in time periods T1, T2, T	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in figure A.7.5.5.1.1-1.				
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For				
	testing of a UE which supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in		
	clause [A.3.6].		·		

Table A.7.5.5.1.1-4: Measurement gap configuration for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

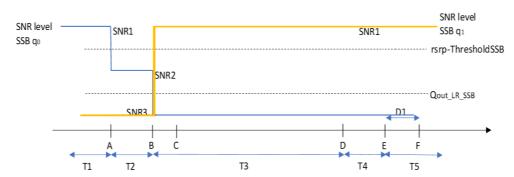


Figure A.7.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [960+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

Co	nfiguration	Description				
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET Reference Channel	Config 1, 2		CR. 3.1 TDD	
SSB Configuration	Config 1, 2		SSB.1 FR2	
SMTC Configuration	Config 1, 2		SMTC.3	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		120 KHz	

PRACH Confi	guration Cor	nfig 1, 2	1	Table A.3.8.3.4	<u> </u>
F IXACIT Coning	guration	ilig 1, Z		Table A.3.0.3.4	
SSB index assigned as BFD RS (q ₀)				0	
SSB index ass	signed as CBD	RS (q ₁)		1	
TCI Configura	tion Cor	nfig 1, 2		TBD	
OCNG parame	eters			OP.1	
CP length	0.0.0			Normal	
	atrix and Antenr	na		2x2 Low	
Configuration	1				
Beam failure	DCI format			1-0	
detection transmission	Number of Co OFDM symbo			2	
parameters	Aggregation I		CCE	8	
paramotoro	Ratio of hypot	thetical	dB	0	
	PDCCH RE e average CSI- energy	nergy to	G.2	· ·	
	Ratio of hypor PDCCH DMR to average CS energy	S energy	dB	0	
	DMRS precod	der		REG bundle size	
	granularity				
	REG bundle s	size		6	
DRX				DRX.3	A.3.3.3
Gap pattern ID) OfSyncThresho	1-1		N.A. absent	When the field
		iu			is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Threshold	ISSB		dBm	TBD	Threshold used for Qout_LR_SSB
powerControl	OffsetSS			db0	Used for deriving rsrp- ThresholdCSI- RS
beamFailureIn	ıstanceMaxCou	nt		n1	see clause 5.17 of TS 38.321 [7]
beamFailureD				pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS config CSI reporting	uration for	Config 1, 2		[CSI-RS.3.1 TDD]	A.3.14.2
TCI states	-			[TCI.State.0]	
CSI-RS for tra		Config 1, 2		[TRS.2.1 TDD]	
	signed as RLM	RS		0, 1	
T310 Timer		ms	1000		
N310 T1			S	<u>2</u> 1	During this time the the UE shall be fully synchronized to cell 1
T2			S	3.37	Cell I
T3			S	2.8	
T4			s	0	
T5			S	0.61	
	10				

D1	S	0.57	
Note 1: All configurations are assigned Note 2: UE-specific PDCCH is not trans		E prior to the start of time period T1 fter T1 starts.	

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter			Unit	Test 1				
				T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB						
EPRE ratio of PDCCH to PDCCH DMRS			dB					
EPRE ratio of PBCH DMRS to SSS			dB					
EPRE ratio of PBCH to PBCH DMRS			dB					
EPRE ratio of PSS to SSS			dB	0				
EPRE ratio of PDSCH DMRS to SSS			dB					
EPRE ratio of PDSCH to PDSCH DMRS			dB					
EPRE ratio of OCNG DMRS to SSS			dB					
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_SSB of set q ₀	of set qo	Config 1	dB	5	-3	-12	-12	-12
		Config 2		5	-3	-12	-12	-12
SNR SSB	of set a	Config 1	dB	-12	-12	-12	-3	10
SINK_33B OF Set q1		Config 2	uБ	-12	-12	-12	-3	10
SNR_CSI-RS of RLM-RS		Config 1	dB	5	5	5	5	5
		Config 2		5	5	5	5	5
N_{oc} Config 1 Config 2			dBm/12	TBD				
		0 KHz	TBD					
Propagation condition				TDL-A 30ns 75Hz				
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start								
Note 4: M Note 5: T	of time period T1. Measurement gap configuration is assigned to the UE prior to the start of time period T1. The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.							
Note 7: S Note 8: T	The signal contains PDCCH for UEs other than the device under test as part of OCNG. SNR levels correspond to the signal to noise ratio over the SSS REs. The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.							
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].								

Table A.7.5.5.2.1-4: Measurement gap configuration for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Field	Test 2		
Field	Value		
gapOffset	0		

Table A.7.5.5.2.1-5: Void



Figure A.7.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [560+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description			
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET	Config 1		CR.3.1 TDD	A.3.1.2
Reference Channel	-			
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120KHz	
subcarrier spacing				
csi-RS-Index assigned			[0]	
failure detection RS in	set q ₀		TD0 0 4 TDD	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	1 2 2 4
OCNG parameters			OP.1	A.3.2.1
CP length Correlation Matrix and	Antonno		Normal 2x2 Low	
Configuration	Antenna		ZXZ LOW	
. <u> </u>	DCI format		1-0	
	Number of		2	
Beam failure	Control			
detection	OFDM			
transmission	symbols	005	•	
parameters	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical	ub.		
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS energy			
	to average			
	CSI-RS RE			
	energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
DDV	size		٥٢٢	
DRX Gap pattern ID			OFF N A	
csi-RS-Index assigned	as candidata		N.A.	
beam detection RS in			'	
rlmlnSyncOutOfSyncT			absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
nowarCantralOffactCC			NA	for Q _{in_LR_SSB}
powerControlOffsetSS			INA	Used for deriving rsrp-
				ThresholdCSI-RS
L				. I I CONCIDENCE I NO

beamFailureInstanceM	axCount		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetection ⁻	Гimer		pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q ₀ and q ₁			CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration Config 1 for CSI reporting			CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned	as RLM RS		0, 1	A.3.14.2
T310 Timer		ms	1000	
N310	N310		2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	1.17	
T3		S	0.9	
T4		S	0	
T5		S	0.31	
D1	•	S	0.27	
Note 1: UE-specific	PDCCH is not tra	insmitted aft	er T1 starts.	

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1					
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMI	dB						
EPRE ratio of PDCCH to P	DCCH DMRS	dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB			0		
EPRE ratio of PDSCH DMF	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	dB						
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5

N_{oc}		Config 1	dBm/15 KHz	TBD			
Propaga	tion condition			TDL-A 30ns 75Hz			
Note 1:	OCNG shall be	used such that the	e resources	in Cell 1 are fully allocated and a constant total			
	transmitted power	er spectral density	y is achieve	ed for all OFDM symbols.			
Note 2:	The uplink resou	irces for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.			
Note 3:	NZP CSI-RS res	source set configu	ration for C	SI reporting are assigned to the UE prior to the start			
	of time period T1.						
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.						
Note 5:				neters are configured prior to the start of time period			
	T1.	3 -		9,			
Note 6:	The signal conta	ins PDCCH for U	Es other th	an the device under test as part of OCNG.			
Note 7:	0			ratio over the SSS REs.			
Note 8:				T5 is denoted as SNR1, SNR2 and SNR3			
11010 0.	respectively in figure A.7.5.5.3.1-1.						
Note 9:	1 , 5						
Note 3.				ands, the SNR during T3 is modified as specified in			
		vilicii supports 4r	A OII all ba	ilius, the Sixix during 13 is modified as specified in			
	clause [A.3.6].						

Table A.7.5.5.3.1-4: Void Table A.7.5.5.3.1-5: Void

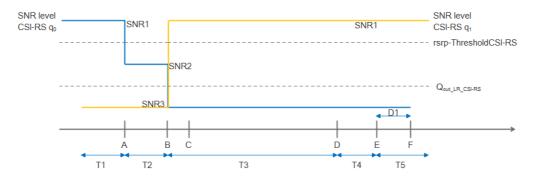


Figure A.7.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description				
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				

Table A.4.5.1.1.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value Test 1	Comment
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	
csi-RS-Index assigned as detection RS in set q ₀	beam failure		[0]	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Anti- Configuration	enna		2x2 Low	
- John Sanation	DCI format		1-0	
Beam failure detection transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
csi-RS-Index assigned as beam detection RS in set			1	
rlmlnSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving rsrp- ThresholdCSI-RS

beamFailureInstanceMax(n1	see clause 5.17 of TS 38.321 [7]	
beamFailureDetectionTim		pbfd4	see clause 5.17 of TS 38.321 [7]	
CSI-RS configuration for q ₀ and q ₁ Config 1			CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for Config 1 CSI reporting			CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned Config 1 as RLM RS			CSI-RS.3.2 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		s	5.43	
T3		S	5.16	
T4		S	0	
T5		S	0.31	
D1		S	0.27	
Note 1: UE-specific PD	CCH is not trans	mitted after	Γ1 starts.	·

Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1					
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMF	RS to SSS	dB					
EPRE ratio of PDCCH to P	DCCH DMRS	dB					
EPRE ratio of PBCH DMRS	S to SSS	dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB			0		
EPRE ratio of PDSCH DMF	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	dB						
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5

N Config 1 dBm/12		TBD				
N_{oc}	1 oc					
Propagat	ion condition			TDL-A 30ns 75Hz		
Note 1:	OCNG shall be u	used such that the	resources	in Cell 1 are fully allocated and a constant total		
	transmitted power	er spectral density	is achieve	ed for all OFDM symbols.		
Note 2:	The uplink resou	irces for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS res	ource set configu	ration for C	SI reporting are assigned to the UE prior to the start		
	of time period T1.					
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.					
Note 5:	The timers and I	ayer 3 filtering rela	ated param	neters are configured prior to the start of time period		
	T1.					
Note 6:				an the device under test as part of OCNG.		
Note 7:	SNR levels corre	espond to the sign	al to noise	ratio over the SSS REs.		
Note 8:	The SNR in time	periods T1, T2, T	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in figure A.7.5.5.4.1-1.					
Note 9:	e 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For					
	testing of a UE v	vhich supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in		
	clause [A.3.6].	·		*		

Table A.7.5.5.4.1-4: Void

Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void

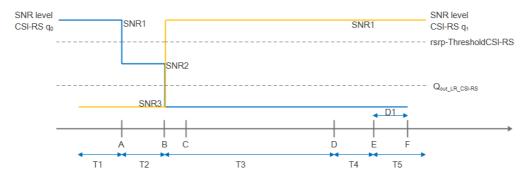


Figure A.7.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Pa	rameter	Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration				
DL dedicated BWP	Config 1, 2		DLBWP.1.1	
configuration				
UL initial BWP	Config 1, 2		ULBWP.0.1	
configuration	Confin 4 0		LILDWD 4.4	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
CORESET Reference	Config 1,2		CR. 3.1 TDD	
Channel	Coming 1,2		OK. 3.1 100	
SSB Configuration	Config 1,2		SSB.1 FR2	
SMTC Configuration	Config 1,2		SMTC.1	
PDSCH/PDCCH	Config 1,2		120 KHz	
subcarrier spacing	,			
SSB index assigned as E	BFD RS (q ₀)		0	
SSB index assigned as (CBD RS (q ₁)		1	
TRS configuration			TRS.2.1 TDD	
TCI configuration			TCI.State.0	
OCNG parameters			OP.1 Setup 1	
	AoA Setup			A.3.15.1
CP length			Normal	
Correlation Matrix and A	ntenna Configuration		2x2 Low	
	DCI format		1-0	
	Number of Control OFDM		2	
Beam failure detection	symbols			
transmission	Aggregation level	CCE	8	
parameters	Ratio of hypothetical	dB	0	
	PDCCH RE energy to			
	average CSI-RS RE			
	energy Ratio of hypothetical	dB	0	
	PDCCH DMRS energy to	UD	U	
	average CSI-RS RE			
	energy			
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	TCC Barraio 6/20		OFF	DRX is not in use
Gap pattern ID			N.A.	No measurement gap
				pattern is configured
ssb-Index			2	Number of SSB
				indexes used for beam
				failure detection
rlmInSyncOutOfSyncThreshold			absent	When the field is
				absent, the UE applies
warn ThreeholdCCD		dD.c.	[04.5]	the 10%
rsrp-ThresholdSSB		dBm	[-94.5]	Threshold used for Q _{in LR}
powerControlOffsetSS			db0	Used for deriving rsrp-
poworodiniololisetoo			abo	ThresholdCSI-RS
beamFailureInstanceMa	xCount		n2	see TS 38.321 [7],
		<u></u>		clause 5.17

beamFailureDetectionTimer			pbfd4	see TS 38.321 [7],
				clause 5.17
CSI Configuration for	Config 1,2		CSI-RS.3.3 TDD	A.3.14.2
reporting				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	2.6	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DI	MRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMI	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB	0				
EPRE ratio of PDSCH DN	/IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2	uБ	5	-3	-12	-12	-12
SNR SSB of set q ₁	Config 1	dB	-12	-12	5	5	5
SINK_SSB of Set q1	Config 2	uБ	-12	-12	5	5	5
N/ Config 1		dBm/15	-104.7				•
N_{oc}	Config 2	KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause [A.3.6].

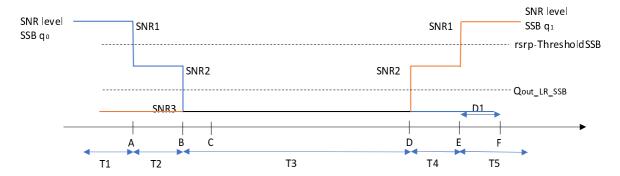


Figure A.7.5.5.5.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.7.5.6 Active BWP switch

A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

UE is configured with a bwp-InactivityTimer timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode		

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this
		1, 2	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell2 timing offset to cell1	นร	3	Time alignment error as specified in TS
	μδ	3	38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell2
Frequency Range		FR2	FR2
Duplex mode			TDD
TDD configuration		TDDConf.3.1	
BW _{channel}		100 MH	z: N _{RB,c} = 66
Active BWP ID		1, 2	3
Downlink initial BWP Configuration		DLE	BWP.0.2
Uplink initial BWP Configuration			BWP.0.2
Downlink active BWP-1 Configuration		DLBWP.1.3	-
Downlink active BWP-2 Configuration		DLBWP.1.3	-
Uplink active BWP-1 Configuration		ULBWP.1.3	-
Uplink active BWP-2 Configuration		ULBWP.1.3	-
PDSCH Reference measurement channel		SR.:	3.1 TDD
TRS configuration		TRS	.2.1 TDD
TCI state		TCI	.State.0
RMSI CORESET parameters		CR.:	3.1 TDD
Dedicated CORESET parameters			
		CCR	.3.1 TDD
OCNG Patterns		(OP.1
SSB Configuration	SSB.1 FR2		3.1 FR2
SMTC Configuration		St	MTC.1
Correlation Matrix and Antenna		1x	2 Low
Configuration			
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS	•		
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS	•		
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS	٩D	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH			U
EPRE ratio of OCNG DMRS to SSS(Note			
1)			
EPRE ratio of OCNG to OCNG DMRS			
(Note 1)			
Propagation Condition		AWGN	AWGN
			·

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A7.5.6.1.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1	Setup 1 defined in clause A.3.15.1
$N_{oc}^{}$ Note1	dBm/15kHz	-112	-112
$N_{oc}^{}$ Note1	dBm/SCS	-103	-103
SS-RSRP ^{Note2}	dBm/SCS Note3	-85	-85
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	18	18
Io ^{Note4}	dBm/95.04 MHz ^{Note4}	-56	-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.

A.7.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

UE is configured with a bwp-InactivityTimer timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Para	meter	Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
•	Config 2,3	1	TDD	TDD
TDD configuration	Config 1		Not Applicable	
J	Config 2	1	TDDConf.1.1	TDDConf.3.1
	Config 3	1	TDDConf.2.1	
BW _{channel}	Config 1,2	MHz	10 MHz: N _{RB,c} = 52	400 MILL NI 00
	Config 3	†	40 MHz: N _{RB,c} = 106	100 MHz: $N_{RB,c} = 66$
Active BWP ID	, ,		1, 2	3
Downlink initial BWP	Configuration		DLBWP.0.2	
Uplink initial BWP Co			ULBW	
Downlink active BWF			DLBWP.1.3	-
Downlink active BW	P-2 Configuration		DLBWP.1.3	-
Uplink active BWP-1	Configuration		DLBWP.1.3	-
Uplink active BWP-2	Configuration		DLBWP.1.3	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.3.1 TDD
measurement	Config 2	†	SR.1.1 TDD	212.1
channel	Config 3	†	SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	
parameters	Config 2	†	CR.1.1 TDD	CR.3.1 TDD
parametere	Config 3	†	CR.2.1 TDD	G14.6.1 122
Dedicated	Config 1		CCR.1.1 FDD	
CORESET	Config 2	†	CCR.1.1 TDD	CCR.3.1 TDD
parameters	Config 3	†	CCR.2.1 TDD	3616.1 122
OCNG Patterns	Coming o		OP.1	
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2
	Config 3	†	SSB.2 FR1	
TRS configuration	Config 1,2,3		-	TRS.2.1 TDD
TCI state	Config 1,2,3		TCI.State.0	TCI.State.0
SMTC Configuration	<u> </u>		SMT	
Correlation Matrix an	d Antenna		NA NA	1x2 Low
Configuration			Link only, see clause A.3.7A	
EPRE ratio of PSS to	SSS		,	
EPRE ratio of PBCH		†		
EPRE ratio of PBCH		†		
EPRE ratio of PDCCH DMRS to SSS		†		
EPRE ratio of PDCCH to PDCCH DMRS		†		
EPRE ratio of PDSCH DMRS to SSS		dB	0	0
EPRE ratio of PDSCH to PDSCH		†		
EPRE ratio of OCNG DMRS to SSS(Note		1		
1)				
EPRE ratio of OCNG	to OCNG DMRS	1		
(Note 1)				
Propagation Conditio	n		NA	AWGN
			Link only, see clause A.3.7A	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		NA	Setup 1 defined in clause A.3.15.1
$N_{\ oc}^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	dBm/15kHz		-112
N oc Note1	dBm/SCS	NA Link only, see clause A.3.7A	-103
SS-RSRP ^{Note2}	dBm/SCS Note3		-85
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB		18
IoNote4	dBm/95.04 MHz ^{Note4}		-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each
- receiver antenna port.

 Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.

A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWP,switchDelay}+k1)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one NR cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell 1's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell 1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell 1.

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell 1's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

	Config	Description				
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	Void.					
Note 2:	A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in					
	A.7.5.6.1.3.					

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS	1	
EPRE ratio of PDSCH to PDSCH]	
EPRE ratio of OCNG DMRS to SSS(Note 1)]	
EPRE ratio of OCNG to OCNG DMRS (Note]	
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

P	arameter	Unit	Cell 2				
Angle of arrival co	onfiguration		Setup 1 defined in				
			clause A.3.15.1				
Noc ^{Note 1}		dBm/15					
		kHz	-112				
N _{oc} Note 1		dBm/SCS	-103				
SS-RSRP Note 2		dBm/120 kHz ^{Note3}	-85				
Ê _s /I _{ot}		dB	18				
Ê _s /N _{oc} Note 5		dB	18				
Io ^{Note2}	Io ^{Note2}		-56				
		MHz Note4	-30				
	rence from other cells and r		•				
			ne and shall be modelled as				
	I of appropriate power for N						
	RP and lo levels have beer		•				
	ation purposes. They are no	•					
Note 3: SS-RSRP minimum requirements are specified assuming independent							
interference and noise at each receiver antenna port.							
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the							
	quiet zone						
Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.							

A.7.5.6.1.3.2 Test Requirements

During T1, the UE shall start to send the ACK for Cell 1 in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for Cell 1 in the DL slot right after slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot ($i+T_{BWPswitchDelay}+kI$), ($j+T_{BWPswitchDelay}+kI$), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part configuration.

The UE shall be able to completely receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.7.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	S	[0.2]	

Table A.7.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter			Unit	Cell 1		
Frequency Range				FR2		
Duplex mod	Duplex mode			TDD		
TDD configuration				TDDConf.3.1		
BW _{channel}				100 MHz: N _{RB,c} = 66		
Active BWF	PID			1		
Initial DL B\	WP Config	uration		DLBWP.0.2		
Initial UL B\				ULBWP.0.2		
Initial Cond		Active DL BWP-1		DLBWP.1.3		
		Configuration		-		
	ĺ	Active UL BWP-1		ULBWP.1.3		
		Configuration				
Final		Active DL BWP-1		DLBWP.1.1		
Condition		Configuration				
00110111011		Active UL BWP-1		ULBWP.1.1		
		Configuration		_		
PDSCH Re	ference me	easurement channel		SR.3.1 TDD		
RMSI COR				CR.3.1 TDD		
		parameters		CCR.3.1 TDD		
OCNG Patt		P		OP.1		
SSB Config				SSB.1 FR2		
SMTC Conf				SMTC.1		
TCI State	ngaradon			TCI.State.0		
TRS Configuration				TRS.2.1 TDD		
Antenna Configuration				1x2		
Propagation Condition				AWGN		
EPRE ratio of PSS to SSS			dB	0		
EPRE ratio o			45	Ü		
EPRE ratio o	of PBCH to F	PBCH DMRS				
EPRE ratio o						
		PDCCH DMRS				
EPRE ratio o						
EPRE ratio o						
EPRE ratio o	OCNG DN	MRS to SSS(Note 1)				
		OCNG DMRS (Note 1)	h collo ara full	y allocated and a constant		
				red for all OFDM symbols.		
				not specified in the test is		
	assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					
		and lo levels have beer				
		purposes. They are no				
				an UL BWP. DLBWP.0.2		
		th ULBWP.0.2; DLBWF				
DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213						
	[3].					

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Parameter		Unit	Cell 2	
Angle of arrival configuration			According to table A.3.15	
	NR_TDD_FR2_A			
N oc Note1	NR_TDD_FR2_B	dBm/15kHz		
	NR_TDD_FR2_F		-112	
	NR_TDD_FR2_G		-112	
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			

		:	1			
Noted		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
N oc Note1	N_{oc}^{Note1}	NR_TDD_FR2_F	dBm/SCS	-103		
		NR_TDD_FR2_G	dDill/SCS			
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
SS-RSRF	Note2	NR_TDD_FR2_F	dBm/SCS	-85		
33-K3KF	2.10.02	NR_TDD_FR2_G	Note3			
		NR_TDD_FR2_T	1			
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B	dBm/95.04 MHz ^{Note4}	-56		
Io ^{Note2}		NR_TDD_FR2_F				
10.10102		NR_TDD_FR2_G				
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y	1			
Note 1:						
Note 2:	SS-RSRP	and lo levels have bee	n derived from o	other parameters for		
	information purposes. They are not settable parameters themselves.					
Note 3:						
Note 4:	interference and noise at each receiver antenna port. Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone					

A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell in the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7 PSCell addition and release delay

A.7.5.7.1 Addition and Release Delay of known NR PSCell

A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2 and A.7.5.7.1.1-3 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the UE shall identify Cell 2 and send an event-triggered report. When the tests system receives the report, it shall send updated measurement control information where the measurement gap pattern is released. Before the start of T3, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T3.

During T3, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T4.

During T4, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T5.

During T5, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

Config	Description					
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz					
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz					
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz					
Note 1: The UE is or	Note 1: The UE is only required to be tested in one of the supported test configurations					

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

	Parameter	Unit	Value	Comment	
RF Cha	annel Number		1, 2	Two radio channels are used for this test	
Active F	PCell		Cell 1	PCell on RF channel number 1 in FR1	
Neighbo	Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2	
A4	Hysteresis	dB	0	Hysteresis for event A4	
	Threshold RSRP	dBm	-97	Threshold for event A4	
	Time to Trigger	S	0	Time to trigger for event A4	
DRX	· · · · · · · · · · · · · · · · · · ·		OFF	For both PCell and PSCell once activated	
Measur	ement gap pattern ID		0	Gaps are configured before T2 and released before T3.	
PRACH	l configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.	
	orting periodicity and onfiguration for Cell 2	ms	[2]		
T1		s	5	During this time the PCell is known and Cell 2 is unknown.	
T2		s		During this time the UE shall identify neighbour cell 2 and report event B1.	
T3		S	1	During this time the UE adds the PSCell.	
T4		s 1		During this time the UE sends CSI reports for PSCell.	
T5		s 1		During this time the UE releases the PSCell.	

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2		
T drameter	0	Comig	00	T1	T2 T3 T4 T5	
Frequency Range		1,2,3	FR1		FR2	
Duplex mode		1	FDD		TDD	
		2,3	TDD		100	
TDD configuration		1	_	ļ		
		2	TDDConf.1.1		TDDConf.3.1	
		3	TDDConf.2.1			
BW _{channel}	MHz	1,2	10: $N_{RB,c} = 52$		400: N 66	
	IVITZ	3	40: N _{RB,c} = 106		100: $N_{RB,c} = 66$	
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1		DLBWP.0.1	
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1		ULBWP.0.1	
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1		DLBWP.1.1	
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1		ULBWP.1.1	
PDSCH Reference Measurement		1	SR.1.1 FDD			
Channel		2	SR.1.1 TDD		SR.3.1 TDD	
		3	SR.2.1 TDD			
TRS configuration		1,2,3	_		TRS.2.1 TDD	
TCI state		1,2,3	_		TCI.State.0	
RMSI CORESET parameters		1	CR.1.1 FDD]		
		2	CR.1.1 TDD		CR.3.1 TDD	
		3	CR.2.1 TDD			
Dedicated CORESET parameters		1	CCR.1.1 FDD	Į		
		2	CCR.1.1 TDD		CCR.3.1 TDD	
		3	CCR.2.1 TDD			
OCNG Patterns ^{Note1}		1,2,3	OP.1		OP.1	
SSB configuration		1,2	SSB.1 FR1	<u> </u>	SSB.2 FR2	
		3	SSB.2 FR1			
SMTC configuration		1,2,3	SMTC.2		SMTC.1	
Correlation Matrix and Antenna config		1,2,3	1x2 Low		1x2 Low	
Angle of Arrival configuration		1,2,3	_		Setup 1	
EPRE ratio of PSS to SSS	-					
EPRE ratio of PBCH DMRS to SSS	=					
EPRE ratio of PBCH to PBCH DMRS	-					
EPRE ratio of PDCCH DMRS to SSS		4.0.0			0	
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0		0	
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1					
EPRE ratio of OCNG DMRS to SSS	-					
EPRE ratio of OCNG blinks to 333	1					
	dBm/					
N _{oc} Note2	15kHz	1,2,3	-98	N/A	-98	
N _{oc} Note2	dBm/SCS	1,2	-98	N/A	-89	
		3	-95 -			
Ê _s /l _{ot}	dB dB	1,2,3	5 5	-∞	<u> </u>	
Ê _s /N _{oc}	uB	1,2,3	-93	-∞	ე ე	
SS-RSRP ^{Note3,4}	dBm/SCS	1,2 3	-93 -90	N/A	-84	
	dBm/ 9.36 MHz	1,2	-63.85	_		
Io ^{Note3,4}	dBm/ 38.16 MHz	3	-57.76	-	-	
	dBm/ 95.04 MHz	1,2,3	_	N/A	-53.82	
Propagation Condition		1,2,3	AWGN		AWGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest [112] ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest [20] ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2 and A.7.5.7.2.1-3 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

Config	Description				
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
Note 1: The UE is only requ	Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1 in FR1
Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2
DRX		OFF	For both PCell and PSCell once activated
PRACH configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.
CSI reporting periodicity and offset configuration for Cell 2	ms	[2]	
T1	S	5	During this time the PCell is known and Cell 2 is unknown.
T2	S	1	During this time the UE adds the PSCell.
Т3	S	1	During this time the UE sends CSI reports for PSCell.
T4	S	1	During this time the UE releases the PSCell.

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2		
raiametei	Oilit	Coming	Cell I	T1	T2 T3 T4	
Frequency Range		1,2,3	FR1		FR2	
Duplex mode		1	FDD			
·		2,3	TDD		TDD	
TDD configuration		1	_			
		2	TDDConf.1.1		TDDConf.3.1	
		3	TDDConf.2.1			
BWchannel		1,2	10: N _{RB,c} = 52		400 11 00	
	MHz	3	40: N _{RB,c} = 106		100: $N_{RB,c} = 66$	
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1		DLBWP.0.1	
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1		ULBWP.0.1	
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1		DLBWP.1.1	
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1		ULBWP.1.1	
PDSCH Reference Measurement		1	SR.1.1 FDD			
Channel		2	SR.1.1 TDD		SR.3.1 TDD	
		3	SR.2.1 TDD			
TRS configuration		1,2,3	_		TRS.2.1 TDD	
TCI state		1,2,3	_		TCI.State.0	
RMSI CORESET parameters		1	CR.1.1 FDD			
		2	CR.1.1 TDD		CR.3.1 TDD	
		3	CR.2.1 TDD			
Dedicated CORESET parameters		1	CCR.1.1 FDD			
		2	CCR.1.1 TDD		CCR.3.1 TDD	
		3	CCR.2.1 TDD			
OCNG Patterns ^{Note1}		1,2,3	OP.1		OP.1	
SSB configuration		1,2	SSB.1 FR1		SSB.2 FR2	
OMTO C. C.		3	SSB.2 FR1			
SMTC configuration		1,2,3	SMTC.2		SMTC.1 1x2 Low	
Correlation Matrix and Antenna config		1,2,3 1,2,3	1x2 Low			
Angle of Arrival configuration EPRE ratio of PSS to SSS		1,2,3	_		Setup 1	
EPRE ratio of PBCH DMRS to SSS	1					
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS	1					
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0		0	
EPRE ratio of PDSCH DMRS to SSS	4.5	1,2,0	· ·		G	
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS	1					
EPRE ratio of OCNG to OCNG DMRS	1					
N _{oc} Note2	dBm/ 15kHz	1,2,3	-98	N/A	-98	
N _{oc} Note2	dBm/SCS	1,2	-98	N/A	-89	
		3	-95			
Ês/lot	dB	1,2,3	5	-∞	5	
Ê _s /N _{oc}	dB	1,2,3	5	-∞	5	
SS-RSRP ^{Note3,4}	dBm/SCS	1,2 3	-93 -90	N/A	-84	
	dBm/ 9.36 MHz	1,2	-63.85	-		
Io ^{Note3,4}	dBm/ 38.16 MHz	3	-57.76	_	_	
	dBm/ 95.04 MHz	1,2,3	-	N/A	-53.82	
Propagation Condition		1,2,3	AWGN		AWGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves. SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the guiet zone.

A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest [572] ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest [20] ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.8 Active TCI state switch delay

A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 1 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The is UE configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ T_{HARQ} +3 ms + $T_{first-SSB}$. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + $(T_{first-SSB} + T_{SSB-proc})$.

Table A.7.5.8.1.1.1-1: Supported test configurations

Config	Description				
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	ם	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ם	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1				
Frequency Range		FR2				
Duplex mode		TDD				
TDD configuration		TDDConf.3.1				
BW _{channel}		100 MHz: N _{RB,c} = 66				
Initial DL BWP Configuration		DLBWP.0.2				
Dedicated DL BWP Configuration		DLBWP.1.1				
Initial UL BWP Configuration		ULBWP.0.2				
Dedicated UL BWP Configuration		ULBWP.1.1				
PDSCH Reference measurement channel		SR.3.1 TDD				
RMSI CORESET parameters		CR.3.1 TDD				
Dedicated CORESET parameters		CCR.3.1 TDD				
OCNG Patterns		OP.1				
SSB Configuration		SSB.1 FR2				
SMTC Configuration		SMTC.1				
TCI State 0		TC. State.0				
TCI State 1		TCI.State.1				
TRS Configuration		TRS.2.1 TDD				
Correlation Matrix and Antenna		1x2 Low				
Configuration						
EPRE ratio of PSS to SSS	dB	0				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS]					
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note						
1)						
Propagation Condition		AWGN				
Note 1: OCNC shall be used such that both calls are fully allocated and a constant						

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

-82.1

-54.9

[-92.1]

[-83.1]

-Infinity

-Infinity

-54.9

1

-82.1

-54.9

N_{oc}Note 1

NocNote 1

Ês/Noc

Io^{Note2}

SS-RSRP Note 2

 Parameter
 Unit
 Cell 1

 SSB0
 SSB1

 T1
 T2
 T1
 T2

 Angle of arrival configuration
 Setup 3 According to clause A.3.15.3

1

-82.1

-54.9

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

	Note 1:	Interference from other cells and noise sources not specified in the test is
		assumed to be constant over subcarriers and time and shall be modelled as
		AWGN of appropriate power for N₀c to be fulfilled.
ı		

- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARO}+3 ms+T_{first-SSB}$

dBm/15 kHz

dBm/SCS

dB

dBm/120 kHz Note3

dBm/95.04 MHz Note4

- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $TO_k*T_{first-SSB}$

A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state0 starts transmitting. The is UE configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing} + T_{first-SSB} + 2ms$.

Table A.7.5.8.2.1.1-1: Supported test configurations

Config	Description				
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	UD	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	O	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1				
Frequency Range		FR2				
Duplex mode		TDD				
TDD configuration		TDDConf.3.1				
BW _{channel}		100 MHz: N _{RB,c} = 66				
Initial DL BWP Configuration		DLBWP.0.2				
Dedicated DL BWP Configuration		DLBWP.1.1				
Initial UL BWP Configuration		ULBWP.0.2				
Dedicated UL BWP Configuration		ULBWP.1.1				
PDSCH Reference measurement channel		SR.3.1 TDD				
RMSI CORESET parameters		CR.3.1 TDD				
Dedicated CORESET parameters		CCR.3.1 TDD				
OCNG Patterns		OP.1				
SSB Configuration		SSB.1 FR2				
SMTC Configuration		SMTC.1				
TCI State 0		TC. State.0				
TCI State 1		TCI.State.1				
TRS Configuration		TRS.2.1 TDD				
Correlation Matrix and Antenna		1x2 Low				
Configuration						
EPRE ratio of PSS to SSS	dB	0				
EPRE ratio of PBCH DMRS to SSS]					
EPRE ratio of PBCH to PBCH DMRS]					
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note						
1)						
Propagation Condition		AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant						

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 1			
		SS	B0	S	SB1
		T1	T2	T1	T2

Angle of arrival			Setup 3 According to clause A.3.15.3					
configura	ation							
N _{oc} Note 1		dBm/15 kHz		[-9	92.1]			
N _{oc} Note 1 dBm/SCS		dBm/SCS		[-8	33.1]			
Ês/Noc		dB	1	1	-Infinity	1		
SS-RSR	P Note 2	dBm/120 kHz Note3	-82.1	-82.1	-Infinity	-82.1		
Io ^{Note2}		dBm/95.04 MHz Note4	-54.9	-54.9	-54.9	-54.9		
Note 1: Interference from other cells and noise sources not specified in the test is								
	assume	d to be constant over sub	carriers and	time and	shall be mod	delled as		
	AWGN (of appropriate power for N	$N_{ m oc}$ to be fulf	illed.				
Note 2:	SS-RSR	RP and lo levels have bee	n derived fr	om other p	arameters fo	or		
	informat	ion purposes. They are n	ot settable p	parameters	themselves	i.		
Note 3:	SS-RSR	RP minimum requirements	s are specifi	ed assumir	ng independ	ent		
	interference and noise at each receiver antenna port.							
Note 4:	Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the							
	quiet zone							
Note 5:	As obser	As observed with 0dBi gain antenna at the center of the guiet zone						

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + T_{first_SSB} + 2ms.

A.7.6 Measurement procedure

A.7.6.1 Intra-frequency Measurements

A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

Co	nfiguration	Description			
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	ote: The UE is only required to be tested in one of the supported test configurations.				

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	s	1, 2	5	

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1, 2	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
TRS configuration		1, 2 1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1, 2	TCI.State.2	N/A
TCI states				
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.1 FR2	SSB.1 FR2
		2	SSB.2 FR2	SSB.2 FR2
Propagation		1, 2	Α	WGN
Condition				

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2

AoA setup		1, 2	S	etup 3 defii	ned in A.3.1	5.3	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	4	-Infinity	8	
Note 2	dBm/15 KHz	1, 2		-	102		
Note 2	dBm/SCS	1	-93				
oc .		2	-90				
SS-RSRP	dBm/SCS	1	-89	-89	-Infinity	-85	
		<u>2</u>	-86	-86	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	8	
Io	dBm/95.04MHz	1, 2	-58.56 for AoA1; -5			8.56 for AoA1;	
			-55.38 f	or AoA2	-55.38 f	or AoA2	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.2 SA event triggered reporting test without gap under DRX

A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

Cor	nfiguration	Description	
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note:	The UE is only required to be tested in one of the supported test configurations.		

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 \sim 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Va	lue	Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Ce	ell 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.2	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1	Cell 2	
			T1 T2	T1 T2	
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1	
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1	
configuration			ULBWP.0.1	ULBWP.0.1	
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1	
configuration					
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1	
configuration					
RLM-RS		1, 2	SSB	SSB	
PDSCH RMC		1, 2	SR.3.1 TDD	N/A	
configuration					
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD	
RMC					
configuration					
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD	
CORESET RMC					
configuration					
TRS configuration		1, 2	TRS.2.1 TDD	N/A	
PDSCH/PDCCH		1, 2	TCI.State.2	N/A	
TCI states					
OCNG Patterns	•	1, 2	OP.1	OP.1	
SSB		1	SSB.1 FR2 SSB.1 FR		
		2	SSB.2 FR2	SSB.2 FR2	
Propagation		1, 2	AWGN		
Condition					

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	II 1	Cell 2		
			T1	T2	T1	T2	
AoA setup		1, 2	S	etup 1 defii	ned in A.3.1	5.1	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46	
$N_{oc}^{$	dBm/15 KHz	1, 2		•	98		
Note 2	dBm/SCS	1		-89			
oc oc		2		-	·86		
SS-RSRP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
Io	dBm/95.04MHz	1	-54.56	-52.21	-54.56	-52.21	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

Cor	nfiguration	Description		
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only required to be tested in one of the supported test configurations.			

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and	One TDD carrier frequency is used for the
		-,, -	Cell 2	NR cells.
Gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SMTC configuration		1, 2	SMTC.1	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Γ	Parameter	Unit	Config	Ce	II 1	Ce	II 2
				T1	T2	T1	T2

TDD configuration	1, 2	TDDConf.3.1	TDDConf.3.1	
Intial BWP	1, 2	DLBWP.0.1	DLBWP.0.1	
configuration		ULBWP.0.1	ULBWP.0.1	
Active DL BWP	1, 2	DLBWP.1.2	DLBWP.1.1	
configuration				
Active UL BWP	1, 2	ULBWP.1.2	ULBWP.1.1	
configuration				
RLM-RS	1, 2	CSI-RS	SSB	
PDSCH RMC	1, 2	SR.3.1 TDD	N/A	
configuration				
RMSI CORESET	1, 2	CR.3.1 TDD	CR.3.1 TDD	
RMC				
configuration				
Dedicated	1, 2	CCR.3.1 TDD	CCR.3.1 TDD	
CORESET RMC				
configuration				
TRS configuration	1, 2	TRS.2.1 TDD	N/A	
PDSCH/PDCCH	1, 2	TCI.State.2	N/A	
TCI states				
OCNG Patterns	1, 2	OP.1	OP.1	
SSB	1	SSB.1 FR2	SSB.1 FR2	
	2	SSB.2 FR2	SSB.2 FR2	
Propagation	1, 2	AWGN		
Condition				

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Ce	Cell 1		Cell 2	
			T1	T2	T1	T2	
AoA setup		1, 2	S	etup 3 defi	ned in A.3.1	5.3	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2	4	4	-Infinity	8	
N_{oc} Note 2	dBm/15 KHz	1, 2		-	102		
Note 2	dBm/SCS	1			-93		
oc oc		2			-90		
SS-RSRP	dBm/SCS	1	-89	-89	-Infinity	-85	
		<u>2</u>	-86	-86	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	8	
Io	dBm/95.04MHz	1, 2		-58.56 for AoA1; -55.38 for AoA2		-58.56 for AoA1; -55.38 for AoA2	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

Coi	nfiguration	Description		
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only required to be tested in one of the supported test configurations.			

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1, 2	PCell (Cel	ll 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE ga	aps	
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3.	.2 TDD	
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.2	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.2	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.2	ULBWP.1.1
configuration				
RLM-RS		1, 2	SCSI-RS	SSB
PDSCH RMC		1, 2	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
TRS configuration		1, 2	TRS.2.1 TDD	N/A
TCI state		1, 2	CSI-RS.Config.0) N/A
OCNG Patterns		1, 2	OP.1	OP.1
SSB	•	1	SSB.1 FR2	SSB.1 FR2
		2	SSB.2 FR2	SSB.2 FR2
Propagation		1, 2		AWGN
Condition				

Table A.7.6.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Се	II 1	Cell 2			
			T1	T2	T1	T2		
AoA setup		1, 2	S	etup 1 defii	ned in A.3.1	5.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46		
N_{oc} Note 2	dBm/15 KHz	1, 2		-98				
Note 2	dBm/SCS	1		-89				
1 oc		2		-86				
SS-RSRP	dBm/SCS	1	-85	-85	-Infinity	-85		
		2	-82	-82	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4		
Io	dBm/95.04MHz	1	-54.56	-52.21	-54.56	-52.21		
T2.	sources for uplink transm	_		•				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.6.1.4.1-5: Void

Table A.7.6.1.4.1-6:Void

A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2 Inter-frequency Measurements

A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.1.1-1: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment		
		configurati on	Test 1	Test 2			
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies is used.		
Active cell		Config 1	NR cell 1 (Pcell)		NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.		
Gap Pattern Id		Config 1	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1	39 39				
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2		
A3-Offset	dB	Config 1	[-30]				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Normal				
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0		L3 filtering is not used		
DRX		Config 1	OFF		DRX is not used		
AoA setup		Config 1	Setup 3		As specified in clause A.3.15		
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.		
T1	S	Config 1	5				
T2	S	Config 1	5.2 for PC1; 5.2 for PC1; 3.5 for other PC PC				

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Ce	II 1	Ce	ell 1
		0	configuratio	T1	T2	T1	T2
			n				
NR RF Channe	NR RF Channel Number		Config 1	1			2
Duplex mode			Config 1	TDD		Т	DD
TDD configura	tion		Config 1	TDDC			onf.3.1
BW _{channel}		MHz	Config 1	100: N _R			RB,c = 66
BWP BW	T	MHz	Config 1	100: N _R			RB,c = 66
BWP	Initial DL			DLBW	/P.0.1	N	I/A
configuration	BWP Initial UL		-				
	BWP			ULBW	/P.0.1	N	I/A
	Dedicated DL		Config 1	DLBW	/P 1 1		I/A
	BWP			DLDVV			,,,
	Dedicated UL		-	L II D\A	/D 4 4	,	1/4
	BWP			ULBW	/P.1.1	N	I/A
OCNG Pattern	s defined in		Config 1				
A.3.2.1.1 (OP.	,			OF		0	P.1
PDSCH Refere			Config 1	SR.3.1	1 TDD		-
measurement			Corning 1				
CORESET Ref	ference		Config 1	CR.3.	1 TDD		-
Channel	and an alatin and						
SMTC configure in A.3.11.1 and			Config 1	SMT	TC.1	SMTC.1	
		1.1.1=	_				
PDSCH/PDCC	H subcarrier	kHz	Config 1	120		120	
spacing TRS configuration			Config 1	TRS.2.	1 TDD	N/A	
TCI configurati			Config 1	CSI-RS.		N/A	
EPRE ratio of			Coming 1	0011101	eering.e		47.1
EPRE ratio of I			=				
to SSS	PDCH DIVIKS						
	PBCH to PBCH		1				
DMRS							
EPRE ratio of	PDCCH DMRS		1				
to SSS							
EPRE ratio of			0 6 - 4				
PDCCH DMRS			Config 1	0		0	
	PDSCH DMRS						
to SSS EPRE ratio of I			-				
PDSCH	FD3CH to						
EPRE ratio of	OCNG DMRS		-				
to SSS(Note 1)							
EPRE ratio of	OCNG to		1				
OCNG DMRS	(Note 1)						
N_{ac} Note2		dBm/15		N/	'A	N	I/A
- oc		kHz					
		Note5	Confic 1	K I i	/Λ		Ι/Λ
N_{oc} Note2		dBm/S CS	Config 1	N/	A	"	I/A
		Note4					
SS-RSRP Note 3	3	dBm/S	Config 1	-87 -87		-Infinity	-87
		CS	- 29	.	.		<u>.</u>
		Note5				<u> </u>	
$\hat{\mathrm{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$		dB	Config 1	N/A	N/A	-Infinity	N/A
rs/ tot							
\hat{E}_{s}/N_{oc}		dB	Config 1	N/A	N/A	-Infinity	N/A
-s / 1 oc							

Io ^{Note3}		dBm/95	Config 1	-58.01	-58.01	-Infinity	-58.01	
		.04						
		MHz						
		Note5						
Propagati	ion Condition		Config 1		A'	WGN		
Note 1:	OCNG shall be used	such that b	ooth cells are ful	ly allocated a	and a consta	nt total trans	mitted power	
	spectral density is ac	hieved for	all OFDM symbo	ols.				
Note 2:	Interference from oth	er cells and	d noise sources	not specified	I in the test is	s assumed to	be constant	
	over subcarriers and	time and s	hall be modelled	l as AWGN o	of appropriate	e power for	N_{oc} to be	
	fulfilled.							
Note 3:	SS-RSRP and lo leve	els have be	en derived from	other param	eters for info	ormation purp	poses. They	
	are not settable para	meters thei	mselves.	·			,	
Note 4:	SS-RSRP minimum i	requirements are specified assuming independent interference and noise at						
	each receiver antenn	na port.						
Note 5:		ceived by an antenna with 0 dBi gain at the centre of the quiet zone						
Note 6:	As observed with 0 d	Bi gain ant	enna at the cent	re of the quie	et zone			

A.7.6.2.1.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test		Test	
		on	1 2 3 4		4		
NR RF Channel Number		Config 1		1,	2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		39		
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	al			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1	Setu p 1	Setu p 1	Setu p 1	Setu p 1	As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3µs				Synchronous cells.
T1	S	Config 1	5				
T2	S	Config 1	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test	Се	II 1	C	cell 2
			configuratio	T1	T2	T1	T2
ND DE O	1.5.1		n				
NR RF Channe			Config 1	1			2
TDD configurat	tion		Config 1	TDDC			Conf.3.1
Duplex mode		N 41 1-	Config 1	TE			TDD
BW _{channel} BWP BW		MHz MHz	Config 1 Config 1	100: N _F 100: N _F			$\frac{N_{RB,c} = 66}{N_{RB,c} = 66}$
BWP	Initial DL	IVIITZ	Corning i	DLBW			N/A
configuration	BWP			DLDV			14/7
	Initial UL BWP]	ULBW	/P.0.1		N/A
	Dedicated DL BWP		Config 1	DLBW	/P.1.1		N/A
	Dedicated UL BWP			ULBW	/P.1.1		N/A
OCNG Pattern A.3.2.1.1 (OP.			Config 1	OF	P.1	(DP.1
PDSCH Refere	ence		Config 1	SR.3.	1 TDD		-
CORESET Ref			Config 1	CR.3.	1 TDD		-
SMTC configur in A.3.11.1 and	ration defined I A.3.11.2		Config 1	SMTC.1		SMTC.1	
PDSCH/PDCC spacing	PDSCH/PDCCH subcarrier		Config 1	120		120	
TRS configurat	TRS configuration		Config 1	TRS.2.1 TDD		N/A	
	TCI configuration		Config 1	CSI-RS.Config.0		N/A	
EPRE ratio of I	PSS to SSS						
EPRE ratio of F	PBCH DMRS						
EPRE ratio of I	PBCH to PBCH						
EPRE ratio of I	PDCCH DMRS						
EPRE ratio of F			Config 1	0		0	
to SSS	PDSCH DMRS						
EPRE ratio of F PDSCH							
EPRE ratio of (
to SSS(Note 1) EPRE ratio of 0							
	OCNG DMRS (Note 1)						
$N_{oc}^{}$ Note2		dBm/15 kHz		-10	4.7	-104.7	
		Note5	Config 1	0.1	. 7		05.7
N_{oc} Note2		dBm/S CS Note4	Config 1	-95). <i>1</i>	-	95.7
SS-RSRP Note 3	i	dBm/S	Config 1	-89.7	-89.7	-Infinity	-86.7
		CS Note5	Johnson I	55.1	55.1		33.7
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	6	6	-Infinity	9

\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9	
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2	
Propagation Condition		Config 1	AWGN				

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class. In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	[-30]		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	OFF		DRX is not used
AoA setup		Config 1	Setup 3		As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	S	Config 1	5		
T2	S	Config 1	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test	Ce	II 1	С	Cell 2	
		J	configuratio	T1 T2		T1 T2		
			n					
NR RF Channe	el Number		Config 1	•	1	2		
Duplex mode			Config 1	TD	DD	Т	DD	
TDD configura	tion		Config 1	TDDC			Conf.3.1	
BW _{channel}		MHz	Config 1		RB,c = 66		I _{RB,c} = 66	
BWP BW	Larga Di	MHz	Config 1		RB,c = 66		I _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBW	/P.0.1	ſ	N/A	
configuration	Initial UL		-					
	BWP			ULBW	/P.0.1	1	N/A	
	Dedicated DL		Config 1	DLBW	/P.1.1	1	N/A	
	BWP							
	Dedicated UL			ULBW	/P 1 1		N/A	
00110 0	BWP		0 " 1	0251	,,,,,,	'		
OCNG Pattern			Config 1	OF	0.4		ND 4	
A.3.2.1.1 (OP. PDSCH Refere	,				1 TDD	1)P.1	
measurement			Config 1	SR.3.	טטו ו		-	
CORESET Re				CR 3	1 TDD		_	
Channel	10101100		Config 1	Ort.o.	1 100			
SMTC configu	ration defined		0 " 1	0143	FO 4	01	TO 4	
in A.3.11.1 and			Config 1	SMTC.1		SMTC.1		
PDSCH/PDCC	H subcarrier	kHz	Config 1	400		120		
spacing	spacing		_	120				
TRS configura			Config 1	TRS.2.1 TDD		N/A		
TCI configurati			Config 1	CSI-RS.Config.0		N/A		
EPRE ratio of	PSS to SSS							
	EPRE ratio of PBCH DMRS							
to SSS								
	PBCH to PBCH							
DMRS EPRE ratio of	PDCCH DMRS		-					
to SSS	I DOON DIVING							
EPRE ratio of	PDCCH to			0		0		
PDCCH DMRS	3		Config 1					
	PDSCH DMRS							
to SSS								
EPRE ratio of	PDSCH to							
PDSCH EPRE ratio of	OCNG DMPS		- I					
to SSS(Note 1								
EPRE ratio of			1					
OCNG DMRS								
N_{oc} Note2		dBm/15		N/	/A	1	V/A	
1 oc		kHz						
		Note5	Confic 4	k i	/Λ		λ1/Λ	
N_{oc} Note2		dBm/S CS	Config 1	N/A			N/A	
		Note4						
SS-RSRP Note 3	3	dBm/S	Config 1	-87 -87		-Infinity	-87	
		CS					- -	
		Note5						
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		dB	Config 1	N/A	N/A	N/A	N/A	
			0 "			21/2		
$\hat{E_s}/N_{oc}$		dB	Config 1	N/A	N/A	N/A	N/A	
-s / - · oc								

Io ^{Note3}		dBm/95	Config 1	-58.01	-58.01	-Infinity	-58.01
		.04	_				
		MHz					
		Note5					
Propagati	ion Condition		Config 1		A\	WGN	
Note 1:	Note 1: OCNG shall be used such that both cells are fully allocated and a constant total to				nt total trans	mitted power	
	spectral density is achieved for all OFDM symbols.						
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant						be constant
	over subcarriers and	time and s	hall be modelled	as AWGN c	of appropriate	e power for	N_{oc} to be
	fulfilled.						
Note 3:	SS-RSRP and lo leve	els have be	en derived from	other param	eters for info	ormation purp	ooses. They
	are not settable para	meters the	mselves.	-			
Note 4:	SS-RSRP minimum i	requiremen	ts are specified	assuming ind	dependent ir	nterference a	nd noise at
	each receiver antenna port.						
Note 5:	Equivalent power rec					the quiet zo	ne
Note 6:	As observed with 0 d	Bi gain ant	enna at the cent	re of the quie	et zone		

A.7.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class. In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	·

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1	1, 2				Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel
							number 1.
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel
							number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap		Config 1	39		39		
offset							
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	al			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.2	.1	.2	
AoA setup		Config 1	Setu	Setu	Setu	Setu	As specified in clause A.3.15
			p 1	p 1	p 1	p 1	
Time offset between		Config 1	3µs				Synchronous cells.
serving and neighbour							
cells		0 " 1	_				
T1	S	Config 1	5				
T2	S	Config 1	11	108	11	108	
			for	for	for	for	
			PC1;	PC1;	PC1;	PC1;	
			6.5	67	6.5	67	
			for	for	for	for	
			othe	othe	othe	other	
			r PC	r PC	r PC	PC	

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test	Test Cel		C	ell 2						
			configuratio	T1 T2		T1 T2							
			n										
NR RF Channel Number			Config 1	1		1		1		1		2	
Duplex mode			Config 1	TDD		TDD							
TDD configura	tion		Config 1	TDDConf.3.1		TDDConf.3.1							
BW _{channel}		MHz	Config 1	100: N	100: $N_{RB,c} = 66$		100: N _{RB,c} = 66 100: N _{RB,c} =		$I_{RB,c} = 66$				
BWP BW		MHz	Config 1	100: N	100: N _{RB,c} = 66 100: N _{RB,c} =		$I_{RB,c} = 66$						
BWP configuration	Initial DL BWP			DLBWP.0.1 ULBWP.0.1		N/A							
comiguration	Initial UL BWP		Config 1			N/A							

Dedicated DL BWP			DLBW	/P.1.1	1	N/A
Dedicated UL BWP			ULBW	/P.1.1	1	N/A
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1	OP.1		OP.1	
PDSCH Reference measurement channel		Config 1	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1	CR.3.	1 TDD		-
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMT	ΓC.1	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	12	20	,	120
TRS configuration		Config 1	TRS.2	.1 TDD	1	V/A
TCI configuration		Config 1		Config.0		V/A
EPRE ratio of PSS to SSS			131113	- y		
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1	0		0	
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{}$ Note2	dBm/15 kHz Note5		-10	4.7	-1	04.7
$N_{oc}^{}$ Note2	dBm/S CS Note4	Config 1	-98	5.7	-9	95.7
SS-RSRP Note 3	dBm/S CS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9
IoNote3	dBm/95 .04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1	1	Α	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the guiet zone

A.7.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class. In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD						
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode						
Note: The UE is only required to be tested in one of the supported test configurations								

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
NR RF Channel		Config 1,2,3	1, 2		Two NR carrier frequencies is
Number					used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	39	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3	[-120]		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
AoA setup		Config 1,2,3	Setup 3		As specified in clause A.3.15
Time offset between		Config 1	3ms		Asynchronous cells.
serving and neighbour					The timing of Cell 2 is 3ms later
cells					than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	S	Config 1,2,3	5.2 for PC1;	5.2 for PC1;	
		, , , , , , , , , , , , , , , , , , ,	3.5 for other PC	3.5 for other PC	

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Ce	ell 1	Cell 2	
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1,2,3	1		2	
Duplex mode		Config 1	F	FDD		ΓDD
		Config 2,3	TDD		TDD TDD	
TDD configuration		Config 1	Not Ap	Not Applicable TDDCo		Conf.3.1

		ı	0	TDD0 (44		2	
			Config 2	TDDConf.1.1		Conf.3.1	
DIM		R AL I	Config 3	TDDConf.2.1	TDDConf.3.1		
BW _{channel}		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66 100: N _{RB,c} = 66		
			Config 2	10: N _{RB,c} = 52 40: N _{RB,c} = 106			
DIAID DIAI		NAL I-	Config 3 Config 1		100: N _{RB,c} = 66		
BWP BW		MHz		10: N _{RB,c} = 52	100: N _{RB,c} = 66		
			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66		
DWD Last at DI			Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66 N/A		
BWP Initial DL configuration BWP				DLBWP.0.1	ľ	N/A	
	Initial UL BWP		Config 1,2,3	ULBWP.0.1	N/A		
	Dedicated DL BWP			DLBWP.1.1	N/A		
	Dedicated UL BWP			ULBWP.1.1	N/A		
OCNG Pattern			Config 1,2,3	OP.1	OP.1		
A.3.2.1.1 (OP.			Confic 4			_	
measurement			Config 1	SR.1.1 FDD		-	
measurement (onariioi		Config 2	SR.1.1 TDD			
			Config 3	SR2.1 TDD			
CORESET Ref	ference		Config 1	CR.1.1 FDD	-		
Channel			Config 2	CR.1.1 TDD			
			Config 3	CR2.1 TDD			
SMTC configur in A.3.11.1 and			Config 1	SMTC.2	SM	TC.2	
			Config 2,3	SMTC.1	SMTC.2		
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	1	20	
spacing			Config 3	30	1	20	
EPRE ratio of I	PSS to SSS						
EPRE ratio of PBCH DMRS to SSS			Config 1,2,3				
EPRE ratio of PBCH to PBCH DMRS					0		
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to				0			
PDCCH DMRS EPRE ratio of PDSCH DMRS			Corning 1,2,3	U			
to SSS							
EPRE ratio of F PDSCH	PDSCH to						
EPRE ratio of 0 to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N_{oc} Note2		dBm/15 kHz Note5				NA	
N _{oc} Note2 SS-RSRP Note 3		dBm/S CS Note4	Config 1,2 Config 3	NA Link only, see clause	NA NA		
		dBm/S	Config 1,2	A.3.7A	-Infinity	-87	
		CS Note5	Config 3		-Infinity	-87	
$\hat{E}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	Config 1,2,3		-Infinity	NA	
		•		•			

\hat{E}_{s}/N_{oc}	dB	Config 1,2,3	-Infinity	NA
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-	-
	dBm/38 .16MHz	Config 3	-	-
	dBm/95 .04 MHz	Config 1,2,3	-Infinity	-58.01
Propagation Condition	Note5	Config 1,2,3	A۱	WGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Supported test configurations are shown in table A.7.6.2.6.1-1.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,					
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD					
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations							

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value				Comment		
		configurati	Test	Test	Test	Test			
		on	1	2	3	4			
NR RF Channel		Config 1,2,3	1, 2		L		Two NR carrier frequencies is		
Number		3 , ,=	,				used.		
Active cell		Config 1,2,3	NR cell 1 (Pcell)			NR Cell 1 is on NR RF channel			
		3 , ,		`	,		number 1.		
Neighbour cell		Config 1,2,3	NR ce	NR cell 2			NR cell 2 is on NR RF channel		
· ·		G					number 2.		
Gap Pattern Id		Config 1,2,3	0 13		13		As specified in clause 9.1.2-1.		
•		3 , ,					·		
Measurement gap		Config 1,2,3	39		39				
offset]							
SMTC-SSB parameters		Config 1	SSB.1 FR1				As specified in clause A.3.10.1		
on NR RF Channel 1		Config 2	SSB.1 FR1			As specified in clause A.3.10.1			
		Config 3	SSB.2				As specified in clause A.3.10.1		
SMTC-SSB parameters		Config 1,2,3	SSB.3				As specified in clause A.3.10.2		
on NR RF Channel 2			002.0				/ to opening in signed / iio / io.		
offsetMO	dB	Config 1,2,3	6						
Hysteresis	dB	Config 1,2,3	0						
a4-Threshold	dBm	Config 1,2,3	[-120]						
CP length		Config 1,2,3	Normal						
TimeToTrigger	s	Config 1,2,3	0						
Filter coefficient		Config 1,2,3	0				L3 filtering is not used		
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3		
			.1	.2	.1	.2	The specimen in contract most		
AoA setup		Config 1,2,3	Setu	Setu	Setu	Setu	As specified in clause A.3.15		
		3 , ,=	p 1	p 1	p 1	p 1			
Time offset between		Config 1	3ms				Asynchronous cells.		
serving and neighbour		3					The timing of Cell 2 is 3ms later		
cells							than the timing of Cell 1.		
		Config 2,3	3µs				Synchronous cells.		
			σμο						
T1	S	Config 1,2,3	5						
T2	S	Config 1,2,3	8 for	82	8 for	82			
-		2 39 .,=,0	PC1;	for	PC1;	for			
			5 for	PC1;	5 for	PC1;			
			othe	52	othe	52			
			r PC	for	r PC	for			
			•	othe	• • •	other			
				r PC		PC			

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Се	II 1	Cell 2		
		configuratio	T1	T2	T1	T2	
		n					
NR RF Channel Number		Config 1,2,3	1			2	
Duplex mode		Config 1	FDD		TDD		
		Config 2,3	TDD		TDD		
TDD configuration		Config 1	Not Applicable		TDDConf.3.1		
		Config 2	TDDConf.1.1		TDDConf.3.1		
		Config 3	TDDConf.2.1		TDDConf.3.1		
BW _{channel}	MHz	Config 1	10: $N_{RB,c} = 52$ 100: $N_{RB,c} = 6$		$N_{RB,c} = 66$		

Config 2 10: Naa_= 52 100: Naa_= 66			1	Confirm	40. N 50	400-1	
BWP BW				Config 2	10: N _{RB,c} = 52		•
Config 2	DIMD DIM		NAL I-		40: NRB,c = 106		
BWP Configuration BWP Initial DL BWP Dedicated DL Dedicated D	DVVP DVV		IVITZ		10: NRB,c = 52		
Initial DL BWP Initial DL BWP Initial UL BWP Initial UL BWP Dedicated DL BWP Dedicated UL BWP					10: NRB,c = 52	100: N	IRB,c = 00
Dedicated DL BWP Dedicated D	DIMD	Initial DI		Coning 3			
BWP Dedicated DL BWP Dedicated UL BWP Dedic		BWP			DLBVVP.U.1	'	N/A
Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP ULBWP.1.1 N/A		BWP		Config 1 2 3			
BMP		BWP		001g 1,2,0	DLBWP.1.1	ľ	N/A
A.3.2.1.1 (OP.1)		BWP			ULBWP.1.1	1	N/A
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				Config 1,2,3	OP.1	C	P.1
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDSCH Refere	ence		Config 1	SR.1.1 FDD		-
Config 3 SR2.1 TDD Config 1 CR.1.1 FDD CR.1.1 FDD Config 2 CR.1.1 TDD Config 3 CR2.1 TDD							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
Channel Config 2 CR.1.1 TDD SMTC configuration defined in A.3.11.1 and A.3.11.2 Config 1 SMTC.2 SMTC.2 PDSCH/PDCCH subcarrier spacing kHz Config 1,2 15 120 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS Config 1,2,3 0 0 EPRE ratio of PDCCH DMRS to SSS Config 1,2,3 0 0 0 EPRE ratio of PDCCH DMRS to SSS Config 1,2,3 0 0 0 EPRE ratio of PDCCH DMRS to SSS(Note 1) Config 1,2,3 0 0 0 EPRE ratio of OCNG DMRS to SSS(Note 1) Config 1,2,3 0 0 0 0 EPRE ratio of OCNG to OCNG DMRS (Note 1) Config 1,2,3 Config 1,2,3 -95.7 -95.7 SS-RSRP Note 3 dBm/S Config 1,2,3 Config 1,2,3 Link only, see clause A.3.7A -Infinity -86.7 -Infinity -86.7 Ê _s /N _{oc} low dB Config 1,2,3 Config 1,2,3 -Infinity -86.7 -Infinity -86.7	CORESET Ref	ference					_
		OI OI IOG					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Charmer						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SMTC configur	ration defined			ONZ.1 1DD		
$ \begin{array}{ c c c c c c c c } \hline PDSCH/PDCCH subcarrier & kHz & Config 1,2 & 15 & 120 \\ \hline spacing & Config 3 & 30 & 120 \\ \hline \hline PRE ratio of PSS to SSS & \\ \hline EPRE ratio of PBCH DMRS & to SSS \\ \hline EPRE ratio of PBCH to PBCH DMRS & to SSS & \\ \hline EPRE ratio of PDCCH DMRS & to SSS & \\ \hline EPRE ratio of PDCCH DMRS & to SSS & \\ \hline EPRE ratio of PDSCH DMRS & to SSS & \\ \hline EPRE ratio of PDSCH DMRS & to SSS & \\ \hline EPRE ratio of PDSCH DMRS & to SSS(Note 1) & \\ \hline EPRE ratio of OCNG DMRS & to SSS(Note 1) & \\ \hline EPRE ratio of OCNG DMRS & Config 1,2 & CS & Config 3 & A CS & Note4 & A CSS & $				Config 1	SMTC.2	SM	ITC.2
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				Config 2,3	SMTC.1	SMTC.1	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	PDSCH/PDCC	H subcarrier	kHz		15	,	20
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$				Config 3	30	,	20
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to			Config 1,2,3	0		0
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$N_{_{OC}}$ Note2		kHz Note5			-95.7	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	<i>o</i> c		CS				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-RSRP Note 3			Config 1,2	NA	-Infinity	-86.7
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			CS		Link only, see clause	-Infinity	
$\hat{E_s}/N_{oc}$ dB Config 1,2,3 -Infinity 9	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			Config 1,2,3	7	-Infinity	9
Io ^{Note3}	\hat{E}_s/N_{oc}		dB	Config 1,2,3		-Infinity	9
	Io ^{Note3}			Config 1,2		-	-

		dBm/38	Config 3		-	-
	1	.16MHz				
		dBm/95	Config 1,2,3		-66.7	- 57.2
		.04	_			
		MHz				
		Note5				
Propagation Condition			Config 1,2,3		A۱	NGN
Note 1:	ote 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power					
	spectral density is acl	hieved for a	all OFDM symbo	ols.		•
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant						
over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be						
	fulfilled.					

- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,					
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD					
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations							

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	est Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	39	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	[-120]		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
AoA setup		Config 1,2,3	Setup 3		As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

NR RF Channel Number	T1 T2 2 TDD TDD TDD TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66
NR RF Channel Number	TDD TDD TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66
Config 2,3 TDD	TDD TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
Config 2,3 TDD	TDD TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
TDD configuration	TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
Config 2 TDDConf.1.1	TDDConf.3.1 TDDConf.3.1 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
BWchannel	100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
Config 2 10: N _{RB,c} = 52	100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
Config 3	100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
BWP BW	100: N _{RB,c} = 66 100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	100: N _{RB,c} = 66 100: N _{RB,c} = 66 N/A
Config 3 40: N _{RB,c} = 106	100: N _{RB,c} = 66 N/A
BWP configuration Initial DL BWP Initial UL BWP Dedicated DL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP	N/A
configuration BWP Initial UL BWP Config 1,2,3 DLBWP.1.1 Dedicated DL BWP Dedicated UL BWP ULBWP.1.1	
BWP Dedicated DL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP	N/A
Dedicated DL BWP Dedicated UL BWP Dedicated UL BWP	. *// `
Dedicated UL BWP.1.1	N/A
OCNG Patterns defined in Config 1.2.3	N/A
A.3.2.1.1 (OP.1) OP.1	OP.1
PDSCH Reference Config 1 SR.1.1 FDD	-
measurement channel Config 2 SR.1.1 TDD	-
Config 3 SR2.1 TDD	_
CORESET Reference Config 1 CR.1.1 FDD	+
Channel Config 2 CR.1.1 TDD	-
Config 3 CR2.1 TDD	7
SMTC configuration defined in A.3.11.1 and A.3.11.2 Config 1 SMTC.2	SMTC.2
Config 2,3 SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier kHz Config 1,2 15	120
spacing Config 3 30	120
EPRE ratio of PSS to SSS	
EPRE ratio of PBCH DMRS to SSS	
EPRE ratio of PBCH to PBCH DMRS	
EPRE ratio of PDCCH DMRS to SSS	
EPRE ratio of PDCCH to PDCCH DMRS Config 1,2,3 0	0
EPRE ratio of PDSCH DMRS to SSS	
EPRE ratio of PDSCH to	
PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)	
to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)	

$N_{_{OC}}$ Note2	dBm/15 kHz Note5			ľ	NA
N Note2	dBm/S	Config 1,2		1	NA
$N_{oc}^{}$ Note2	CS Note4	Config 3		NA	
SS-RSRP Note 3	dBm/S	Config 1,2		-Infinity	-87
	CS Note5	Config 3		-Infinity	-87
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2,3	NA .	-Infinity	NA
\hat{E}_s/N_{oc}	dB	Config 1,2,3	Link only, see clause A.3.7A	-Infinity	NA
Io ^{Note3}	dBm/9. 36MHz	Config 1,2		-	-
	dBm/38 .16MHz	Config 3		-	-
	dBm/95 .04	Config 1,2,3		Infinity	-58.01
	MHz Note5				
Propagation Condition		Config 1,2,3		AV	VGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

Supported test configurations are shown in table A.7.6.2.8.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD				
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3	1, 2				Two NR carrier frequencies is used.
Active cell		Config 1,2,3		II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2			As specified in clause A.3.10.2	
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	[-120]				
CP length		Config 1,2,3	Normal				
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2,3	Setu p 1	Setu p 1	Setu p 1	Setu p 1	As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	Зµѕ				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	for PC1; 6.5 for othe r PCT BD	108 for PC1; 67 for othe r PCT BD	for PC1; 6.5 for othe r PCT BD	108 for PC1; 67 for other PCT BD	

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Ce	ell 1	Cell 2			
		configuratio	T1 T2		T1	T2		
		n						
NR RF Channel Number		Config 1,2,3	1		2			
Duplex mode		Config 1	FDD		TDD			
	Config 2,3 TDD		TDD					
TDD configuration		Config 1		Not Applicable		Not Applicable		Conf.3.1
		Config 2	TDDC	Conf 1 1	TDDC	Conf.3.1		

			Config 3	TDDConf.2.1	TDD	Conf.3.1
BWchannel		MHz	Config 1	10: N _{RB,c} = 52		√RB,c = 66
			Config 2	10: N _{RB,c} = 52		√RB,c = 66
			Config 3	40: N _{RB,c} = 106	100: N	√RB,c = 66
BWP BW		MHz	Config 1	10: N _{RB,c} = 52	100: N	NRB,c = 66
			Config 2	10: $N_{RB,c} = 52$	100: N	$I_{RB,c} = 66$
			Config 3	40: $N_{RB,c} = 106$	100: N	$I_{RB,c} = 66$
BWP configuration	Initial DL BWP			DLBWP.0.1	ı	N/A
	Initial UL BWP		Config 1,2,3	ULBWP.0.1		N/A
	Dedicated DL BWP		Coming 1,2,3	DLBWP.1.1	I	N/A
	Dedicated UL BWP			ULBWP.1.1	ı	N/A
OCNG Patterns A.3.2.1.1 (OP.1			Config 1,2,3	OP.1	c)P.1
PDSCH Refere	ence		Config 1	SR.1.1 FDD		-
measurement of	channel		Config 2	SR.1.1 TDD	1	
			Config 3	SR2.1 TDD	1	
CORESET Ref	erence		Config 1	CR.1.1 FDD		-
Channel	0.000		Config 2	CR.1.1 TDD		
-			Config 3	CR2.1 TDD	1	
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.2	SN	ITC.2
			Config 2,3	SMTC.1	SN	ITC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15		120
spacing			Config 3	30		120
EPRE ratio of F	PSS to SSS					
EPRE ratio of F	PBCH DMRS					
to SSS EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of F to SSS						
EPRE ratio of F			Confic 4 0 0	_		
PDCCH DMRS			Config 1,2,3	0		0
EPRE ratio of F						
EPRE ratio of F PDSCH	PDSCH to					
EPRE ratio of (to SSS(Note 1)						
EPRE ratio of O	OCNG to					
N_{oc} Note2	,	dBm/15 kHz Note5			-104.7	
3.7		dBm/S	Config 1,2		-95.7 -95.7	
$N_{\!oc}$ Note2		CS	Config 3	NIA		
SS-RSRP Note 3		Note4 dBm/S	Config 1.2	NA	-Infinity	_06.7
JO-NORP		CS	Config 1,2 Config 3	Link only, see clause A.3.7A	-Infinity -Infinity	-86.7 -86.7
Ê/I		Note5 dB	Config 1,2,3		-Infinity	9
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		ub	Oornig 1,2,5			_

dBm/9.	Config 1,2		-	-
36MHz				
dBm/38	Config 3		-	-
.16MHz	_			
dBm/95	Config 1,2,3		-66.7	-57.2
.04				
MHz				
Note5				
	Config 1,2,3		A۱	NGN
	36MHz dBm/38 .16MHz dBm/95 .04 MHz	36MHz dBm/38	36MHz dBm/38	36MHz dBm/38 Config 3 .16MHz - dBm/95 Config 1,2,3 .04 MHz Note5 -

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3 L1-RSRP measurement for beam reporting

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
33B configuration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	640
T1	1~2	S	5
T2	1~2	S	1
Propagation condition	1~2		AWGN
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG	1~2	dB	0
DMRS Note 1	1.0		AMON
Propagation condition	1~2		AWGN

Parameter	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config	Onit	T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			
$N_{oc}^{ m Note2}$	1~2	dBm/15kHz		-1	05	
∖ / Note2	1	dBm/SSB SCS		-6	96	
$N_{_{OC}}$ Note2	2	UBIII/33B 3C3		-6	93	
${\hat{ m E}}_{ m s}/{ m I}_{ m ot}$	1~2	dB	0	0	-Infinity	9
SSB RSRP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
COD INCINI	2	ubili/oob ooo	-93	-93	-Infinity	-84
Io Note3	1	JD /05 0 4 M J -	-67.5	-67.5	-71.1	-60.7
10	2	dBm/95.04MHz	-67.5	-67.5	-71.1	-60.7
\hat{E}_s/N_{oc}	1~2	dB	0	0	-Infinity	9

Table A.7.6.3.1.2-2: SSB specific test parameters

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
COB comigaration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	640
T1	1~2	S	5
T2	1~2	S	1
Propagation condition	1~2		AWGN
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0
EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation condition	1~2		AWGN
i ropagation condition	1~4	l	AWGIN

SSB#1 **Parameter** Config Unit **T1** T1 **T2 T2** Angle of arrival Setup 1 according to A.3.15.1 configuration N_{oc} Note2 1~2 dBm/15kHz -105 1 -96 N_{oc} Note2 dBm/SSB SCS 2 -93 \hat{E}_{s}/I_{c} 1~2 0 0 -Infinity 9 dB 1 -96 -87 -96 -Infinity SSB RSRP Note3 dBm/SSB SCS 2 -93 -93 -Infinity -84 1 -67.5 -67.5 -71.1 -60.7 lo Note3 dBm/95.04MHz 2 -67.5 -67.5 -71.1 -60.7 1~2 dB 0 0 -Infinity 9

Table A.7.6.3.2.2-2: SSB specific test parameters

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

Co	onfig	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: T	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 160ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		Off
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		26
Propagation condition	1		AWGN
T1	1	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to	1	dB	0
SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1			

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
Angle of arrival configuration	1		Setup 1 according to A.3.15.1		
$N_{oc}^{ m Note1}$	1	dBm/15kHz	-105		
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1	dB	0	9	
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97 -86.97		
lo Note2	1	dBm/95.04MHz	-63.97 -57.47		
\hat{E}_s/N_{oc}	1	dB	0	9	

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.3.3.3 Test Requirements

After 160ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

SSB GSCN	Parameter	Config	Unit	Value
TDD Configuration	SSB GSCN	1		freq1
BW_channel	Duplex mode	1		TDD
PDSCH Reference measurement channel	TDD Configuration	1		TDDConf.3.1
Measurement channel 1	BWchannel	1	MHz	100: N _{RB,c} = 66
Channel 1 CR.3.1 TDD Dedicated CORESET Reference Channel 1 CCR.3.1 TDD SSB configuration 1 SSB.1 FR2 CSI-RS configuration 1 CSI-RS.3.3 TDD OCNG Patterns 1 OP.1 Initial BWP Configuration 1 DLBWP.0.1 ULBWP.0.1 Dedicated BWP configuration 1 DLBWP.0.1 ULBWP.0.1 SMTC configuration 1 SMTC.1 TRS.2.1 TDD TRS Configuration 1 TRS.2.1 TDD PDCCH/PDSCH TCI Configuration 1 TCI.State.2 DRX configuration 1 DRX.3 reportConfigType 1 aperiodic reportQuantity Number of reported RS 1 2 qcI-Info 1 SSB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1 26 Propagation condition 1 s T1 1 s 5 EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCH by DBCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to OCNG DMRS Note 1 dB		1		SR.3.1 TDD
CCR.3.1 TDD		1		CR.3.1 TDD
CSI-RS configuration		1		CCR.3.1 TDD
OCNG Patterns 1 OP.1 Initial BWP Configuration 1 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 Dedicated BWP configuration 1 DLBWP.1.3 ULBWP.1.3	SSB configuration	1		SSB.1 FR2
DLBWP.0.1 ULBWP.0.1		1		
Dedicated BWP configuration 1	OCNG Patterns	1		
Dedicated BWP configuration 1	Initial BWP Configuration	1		ULBWP.0.1
TRS Configuration 1 TRS.2.1 TDD PDCCH/PDSCH TCI Configuration 1 TCI.State.2 DRX configuration 1 DRX.3 reportConfigType 1 aperiodic reportQuantity 1 cri-RSRP Number of reported RS 1 2 qcl-Info 1 SSB#0 for resource#0 reportSlotOffsetList 1 26 Propagation condition 1 AWGN T1 1 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS BRS DMRS 0 EPRE ratio of PDSCH DMRS to SSSNote 1 EPRE ratio of OCNG DMRS to SSSNote 1 BPRE ratio of OCNG DMRS to OCNG DMRS Note 1		1		ULBWP.1.3
DDCCH/PDSCH TCI		-		
DRX configuration		1		TRS.2.1 TDD
DRX configuration 1 DRX.3 reportConfigType 1 aperiodic reportQuantity 1 cri-RSRP Number of reported RS 1 2 qcl-Info 1 SSB#0 for resource#0 reportSlotOffsetList 1 26 Propagation condition 1 AWGN T1 1 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS s 5 EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS a 0 0 EPRE ratio of PDSCH to PDSCH DMRS to SSS/BPRE ratio of PDSCH to PDSCH DMRS a 0		1		TCI.State.2
reportConfigType 1 aperiodic reportQuantity 1 cri-RSRP Number of reported RS 1 2 qcl-Info 1 SSB#0 for resource#0 reportSlotOffsetList 1 26 Propagation condition 1 AWGN T1 1 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS s 5 EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS a 0 0 EPRE ratio of PDSCH to PDSCH DMRS to SSS/SNOte 1 EPRE ratio of OCNG DMRS to SSS/SNOte 1 a 0 0 EPRE ratio of OCNG to OCNG DMRS to SSS/SNOte 1 EPRE ratio of OCNG to OCNG DMRS to SSS/SNOte 1 0 0 0		1		DRX.3
TeportQuantity		1		aperiodic
Number of reported RS		1		
TeportSlotOffsetList		1		2
Propagation condition	qcl-Info	1		
Propagation condition 1 AWGN T1 1 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS 0 EPRE ratio of PDSCH DMRS to SSS 1 dB 0 EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG DMRS to OCNG DMRS Note 1 EPRE ratio of OCNG DOCNG DMRS to OCNG DMRS Note 1	reportSlotOffsetList	1		
T1		1		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1			S	
SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1	EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS	1	dB	0
	SSS ^{Note 1} EPRE ratio of OCNG to OCNG			1 6 11 11 4 1 1

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1		Setup 1 according to A.3.15.1			
$N_{oc}^{ m Note1}$	1	dBm/15kHz	-105			
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1	dB	0	9		
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97		
lo ^{Note2}	1	dBm/95.04MHz	-63.97 -57.47			
\hat{E}_s/N_{oc}	1	dB	0	9		

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.6.3.4.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.7 Measurement Performance requirements

A.7.7.1 SS-RSRP

A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target

cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	Unit	T1		T2	
raiailletei	Onn	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID		489	0	489	0

SSB ARFCN		fre	a1	fre	q1
Duplex mode		TDD		TDD	
TDD configuration		TDDC	onf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _R	B,c = 24	100: N _F	RB,c = 24
Downlink initial BWP configuration		DLB WP.0. 1	-	DLB WP.0. 1	-
Downlink dedicated BWP configuration		DLB WP.1.	-	DLB WP.1.	-
Uplink initial BWP configuration		ULB WP.0. 1	-	ULB WP.0. 1	-
Uplink dedicated BWP configuration		ULB WP.1. 1	1	ULB WP.1. 1	1
DRX cycle configuration		Not applic able	-	Not applic able	-
TRS configuration		TRS.2 .1 TDD	-	TRS.2 .1 TDD	-
TCI state		TCI.St ate.0	-	TCI.St ate.0	-
PDSCH Reference measurement channel		SR.3. 1 TDD	-	SR.3. 1 TDD	-
RMSI CORESET Reference Channel		CR.3. 1 TDD	-	CR.3. 1 TDD	-
Control channel RMC		CCR. 3.1 TDD	-	CCR. 3.1 TDD	-
OCNG Patterns		OP.3	OP.3	OP.3	OP.3
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
SMTC configuration		SMTC .1	SMTC .1	SMTC .1	SMTC .1
Time offset with Cell 1	μs	-	3	-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	dB	0	0	0	0

		1				
Propagation conditions			AWG	AWG	AWG	AWG
			N	Ν	N	N
Antenna configuration 1x2 1x2 1x2 1					1x2	
Note 1:	1: OCNG shall be used such that both cells are fully allocated and a constant					
	total transmitted power sp	ectral density	is achiev	ed for all	OFDM sy	mbols.
Note 2:	Void					
Note 3:	Void					
Note 4:	Void					
Note 5:	Void					

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Param	otor	Unit	nit T1 T2			2		
Faraii	ietei	Offic	Cell 1	Cell 2	Cell 1	Cell 2		
Angle of a configura			According to clause A.3.15.1		According to clause A.3.15.1			
$N_{\!oc}$ Note1	ı	dBm/15kH z ^{Note4}	- 9 ⁻	1.6	N/A			
$N_{\!oc}$ Note1	l	dBm/SCS Note4	-82	2.6	N/A			
\hat{E}_s/N_o	c	dB	6.0	1.0	N/A	N/A		
Es		dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +3.1dB)	(Table B.2.2-2 Rx Beam Peak +3.1dB)		
SSB_RPNote2 dBm/SCS			-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +3.1dB)	(Table B.2.2-2 Rx Beam Peak +3.1dB)		
$\hat{\mathrm{E}}_{_{\! ext{s}}}/\mathrm{I}_{_{\! ext{ot}}{}_{\! ext{BB}}}$	$\hat{E}_{_{\scriptscriptstyle S}}/I_{_{\scriptscriptstyle { m ot}{}^{ m BB}}}$ Note6 dB		2.44	-5.98	-5.98	-5.98		
lo ^{Note2}		dBm/95.04 MHz ^{Note4}	-50	.05	`	.2.2-2 Rx (+30.70dB)		
Note 1:		used, interfered and in the test is						
	and sha	all be modelle	d as AWGN o	of appropriate	power for Λ	J_{oc} to be		
Note 2: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.								
Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone								
Note 5: Note 6:	Note 5: Void							

A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3						
	Cell 1	SSB_RP1 -δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G _{max}					
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}					
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration						
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo used in the test						
Note 3:	Note 3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class						

A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

	Configuration	Description
Ī	1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
ſ	2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

SSB ARFCN	
BWchannel 1-2	Cell 2
SW-bannel 1~2 N_Res_ = 24 N_Res_ = 24 O	freq2
Nage = 24 Nage = 24 Nage = 24	
Duplex mode	
TDD configuration	
PDSCH Reference measurement channel 1-2 SR.3.1 TDD - SR.3.1 TDD	TDD
RMSI CORESET Reference Channel 1~2 CR.3.1 TDD - CR.3.1 TDD	.1
Reference Channel 1~2 CR.3.1 TDD - CR.3.1 TDD	-
SSB configuration	-
SSB configuration 2 SSB.2 FR2 SSB.2 FR2	-
CONG Patterns	
Initial BWP	2
Configuration	
Dedicated BWP configuration 1~2 DLBWP.1.3 ULBWP.1.3 INUBLE INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE IN INUBLE INUBLE IN	
PDCCH/PDSCH TCI Configuration 1~2 SMTC.1 SMTC.1 Time offset between Cell 2 and Cell 3	3
Configuration 1~2 ICI.State.2 ICI.State.2 SMTC configuration 1~2 SMTC.1 Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDSCH to PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG	D
Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG	2
Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG	
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG	
DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1	0
	WGN
	1x2

Note 2: Void

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

_	Test 1 Test 2												
Paramete	r	Unit	Cell 1	Cell 2	Cell 1 Cell 2								
Angle of arriv	al		According A.3.1	to clause	According to clause A.3.15.4.2								
configuration			Spherical coverage	Rx Beam Peak	Spherical coverage	Rx Beam Peak							
N_{oc} Note1		dBm/15kH z ^{Note4}	-90.6	-90.6	(Table B.2.3-2 Rx Beam Peak +1.97dB)	(Table B.2.3-2 Rx Beam Peak - 3.03dB)							
$N_{oc}^{}$ Note1		dBm/SCS Note4	-81.6	-81.6	(Table B.2.3-2 Rx Beam Peak +11.0dB)	(Table B.2.3-2 Rx Beam Peak +6.0dB)							
\hat{E}_s/N_{oc}		dB	6.0	6.0	17.0	-1.0							
SSB_RP ^{Note2}		dBm/SCS	-75.60 -75.60		(Table B.2.3-2 Rx Beam Peak +28.0dB)	(Table B.2. 3-2 Rx Beam Peak +5.0dB)							
(SSB_RP _{Cell 1} - SSB_RP _{Cell 2}) dB 0				23	.00								
$\hat{E}_{_{\! ext{S}}}/I_{_{\! ext{ot}}{}_{\! ext{BB}}}$ Note(6	dB	5.29	5.96	8.86	-3.92							
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-50.03	-50.03	(Table B.2.3-2 Rx Beam Peak +52.68dB)	(Table B.2.3-2 Rx Beam Peak +33.13dB)							
(lofreq 1 - lo fre	q 2)	dB	()	19	.55							
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.													
Note 2: SSB_RP, Es/lot, Io, (SSB_RP _{Cell 2} – SSB_RP _{Cell 1}) and (Io _{freq 2} – Io _{freq 1}) levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of													
Note 5: Vo Note 6: Ca va of	id Ilculat Iue as TS 36	tion of Es/lot _B ssumed for the 5.101-2 [19], a	e associated and an allowa	Refsens requince of 2dB fo	iirement in cla or UE multi-ba	the quiet zone Note 5: Void							

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3,4			
	Cell 1	SSB_RP1 - δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 + δ +G _{max}		
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}		
Note 1:		quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration		
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test			
Note 3:	G _{min} and G _{max} are t according to the UI	the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class		
Note 4:	X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.			

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes1,2,3,4			
C	ell 2 – Cell 1	SSB_RP2 - SSB_RP1 - δ ≤ Reported RSRP(dB) ≤ SSB_RP2 - SSB_RP1 + δ -(X)			
Note 1:	lote 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration				
Note 2: Note 3:	Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1				
Note 4:					

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	120 kHz SSB SCS, 100 MHz
	bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2 . The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Tes	st 2
Parameter	Coning	Onit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
	1		10: N _{RB,c} = 52		10: N _{RB,c} = 52	
BW _{channel}	2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	10: N _{RB,c} = 52	100: N _{RB,c} = 66
	3		40: N _{RB,c} = 106		40: N _{RB,c} = 106	
	1		FDD		FDD	
Duplex mode	2		TDD	TDD	TDD	TDD
	3		TDD		TDD	
	1		N/A		N/A	
TDD configuration	2		TDDConf. 1.1	TDDConf. 3.1	TDDConf. 1.1	TDDConf. 3.1
	3		TDDConf. 2.1	0.1	TDDConf. 2.1	0.1
PDSCH Reference	1		SR.1.1 FDD		SR.1.1 FDD	
measurement channel	2		SR.1.1 TDD	-	SR.1.1 TDD	-
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD	
DMCLCODECET	1		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET Reference Channel	2		CR.1.1 TDD	-	CR.1.1 TDD	-
Reference Charmer	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
Reference Charmer	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1		SSB.1 FR1		SSB.1 FR1	
SSB configuration	2		SSB.1 FR1	SSB.1 FR2	SSB.1 FR1	SSB.1 FR2
	3		SSB.2 FR1		SSB.2 FR1	
OCNG Patterns	1~3		OP.1		OF	2.1
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1		DLBW ULBW	
Dedicated BWP configuration	1~3		DLBWP.1.3 ULBWP.1.3		DLBWP.1.3 ULBWP.1.3	
TRS Configuration	1~3		TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~3		TCI.State.2		TCI.State.2	
SMTC configuration	1~3		SM	ΓC.1	SMTC.1	

Time offset between Cell 2 and Cell 3	1~3	μs	3	3	3	3
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH						
DMRS to SSS						
EPRE ratio of PBCH to						
PBCH DMRS						
EPRE ratio of PDCCH						
DMRS to SSS						
EPRE ratio of PDCCH to			_	_	_	_
PDCCH DMRS	1~3	dB	0	0	0	0
EPRE ratio of PDSCH						
DMRS to SSS						
EPRE ratio of PDSCH to						
PDSCH DMRS						
EPRE ratio of OCNG						
DMRS to SSS ^{Note 1}						
EPRE ratio of OCNG to						
OCNG DMRS Note 1						
Propagation condition	1~3	-	NA	AWGN	NA	AWGN
			Link only,		Link only,	
Antenna configuration	1~3	-	see clause	1x2	see clause	1x2
			A.3.7A		A.3.7A	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test 2 NOTE 3							
Parameter	Config	Onit	Cell 1	Cell 2	Cell 1	Cell 2						
N_{oc}	1~4	dBm/15 kHz		TBD		NA						
N_{oc}	1,2	dBm/SS	Т	TBD		NA						
	3,4	B SCS		TBD		NA						
\hat{E}_{s}/I_{ot}	1~4	dB		TBD	NA Link only, see	NA						
SS-RSRP ^{Note1}	1,2	dBm/SC S	NA Link only, see	TBD		As in Table B.2.3-2						
35-K3KP*****	3,4		S	S	S	S	S	S	S	clause A.3.7A	TBD	clause A.3.7A
Io ^{Note1}	1~4	dBm/ 95.04M Hz		TBD		SS- RSRP+ 28.98						
\hat{E}_{s}/N_{oc}	1~4	dB		TBD		NA						

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.7.7.2 SS-RSRQ

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter	Unit	Test 1		Test 2	
raiailletei	Unit	Cell 1	Cell 2	Cell 1	Cell 2

	Fred	11	l Fr	eq1
		•		DD
	TDDCo	nf.3.1	TDDC	Conf.3.1
MHz	100: N _{RB}	$_{c} = 66$	100: N _{RB,c} = 66	
			/P.0.1	·
1		DLBW	/P.1.1	
1				
		ULBW	/P.1.1	
	TRS.2.1		TRS.2.	
	TDD		1 TDD	
	TCI.State		TCI.Sta	
	.0		te.0	
		-		
		-		-
		00.4		OD 4
	OP.1			OP.1
	CCD 1			SSB.1
				FR2
kH7				120
KIIZ	120			120
		110171	Jiiodbio	
1				
1				
1				
dB	0	0	0	0
1				
dB	3	3	-3	-3
	AWC	SN .	AV	VGN
	1x2	2	1	x2
	kHz	TDDC0 MHz 100: N _{RB} TRS.2.1 TDD TCI.State .0 SR.3.1 TDD CCR.3.1 TDD CCR.3.1 TDD OP.1 SSB.1 FR2 kHz 120 dB 0 dB 3 AWC	TDD TDDConf.3.1 MHz 100: N _{RB,c} = 66 DLBW ULBW ULBW TRS.2.1 TDD TCI.State .0 SR.3.1 TDD CR.3.1 TDD CR.3.1 TDD CR.3.1 TDD SSB.1 SSB.1 FR2 FR2 KHz IdB AB O O O O O O O O O O O O O O O O O	TDD

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Void

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

		I Imit	Tes	st 1	Test 2		
		Unit	Cell 1	Cell 2	Cell 1	Cell 2	
Angle of arriv	al configuration		Accord			to clause	
			clause A	A.3.15.1	A.3.	15.1	
$N_{oc}^{ m Note1}$		dBm/15kHz ^N ote4	-9	5	<u>.</u> و	95	
$N_{oc}^{}$ Note1		dBm/SCS ^{Note}	-86 -86		86		
SS-RSRP ^{Note}	2	dBm/SCS Note4	-83	-83	-89	-89	
SS-RSRQ Note	e2	dB	-14.77	-14.77	-16.81	-16.81	
\hat{E}_{s}/I_{ot}		dB	-1.76	-1.76	-4.76	-4.76	
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-50		-54	-54	
Note 1: Int	erference from other cells and i	noise sources no	ot specified	in the test	is assumed to	be constant	
over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone NR operating band groups are as defined in Clause 3.5.2. Note 7: Void							

A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-3.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-4.5dB according to the requirements in clause 10.1.8.1.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3. Relative accuracy shall fulfil the requirements in clause 10.1.8.1.1.

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Parameter	l Init		Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	

SSB ARFCN		Freq1	freq2	freq1	Freq2
Duplex mode		TE	DD	T	DD
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}	MHz	100: N _F	RB,C = 66	100: N _F	RB,C = 66
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1	dB	0	0	0	0
\hat{E}_s/N_{oc}	dB	-1.75	-1.75	3	-1.75

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2

AoA setup			Setup 1 A.3	in clause .15.	Setup 1 A.3	in clause .15.
$N_{oc}^{$		dBm/15kHz ^N ote4	-94.03		-94.03	
$N_{oc}^{$		dBm/SCS ^{Note}	-85.0		-85.0	
SSB_RP ^{Note2}		dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSRQ ^{Note2}		dB	-14.75	-14.75	-15.56	-15.56
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		dB	-1.75	-1.75	-3	-3
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.						
 Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: Void Note 7: Void 						

A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -3.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -4.5dB according to the requirements in clause 10.1.10.1.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.7.7.3 SS-SINR

A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Te	st 1	Test 2	
	Onit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		Freq2		Freq2	

Duplex mode		ТГ	DD .	ТГ	DD .
TDD configuration		TDDConf.3.1		TDDC	
BWchannel	MHz		RB,c = 66		$_{B,c} = 66$
Downlink initial BWP configuration		DLBWP.0.1			
Downlink dedicated BWP configuration			DLBV	VP.1.1	
Uplink initial BWP configuration			ULBV	VP.0.1	
Uplink dedicated BWP configuration				VP.1.1	
DRX cycle configuration	ms		Not ap	plicable	
TRS configuration			TRS.2	.1 TDD	
TCI state			TCI.S	State.0	
AoA setup		Se	etup 3 defi	ned in A.3.	15
PDSCH Reference measurement channel		SR.3.1		SR.3.1	
PDSCH Reference measurement channel		TDD		TDD	
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1	
		TDD	_	TDD	
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_
Channel		.1 TDD		1 TDD	
OCNG Patterns				OP.1	
SMTC configuration		SMTC.1			
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1
		FR2	FR2	FR2	FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
SS-RSSI-Measurement			Not Ap	plicable	ı
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
A /					_
\hat{E}_{s}/N_{oc}	dB	4.54	2.66	-3	-3
Propagation conditions		AWGN			
Antenna configuration 1x2					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Test 1		Test 3	
Farameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration		According to		According to	
Angle of arrival configuration		clause /	4.3.15.1	clause /	4.3.15.1

$N_{oc}^{}$ Note1		dBm/15kHz Note4	-105		-105	
$N_{oc}^{ m Note1}$	$N_{oc}^{$ Note1		-96		-96	
SS-RSRF	SS-RSRP ^{Note2}		-91.46	-93.34	-99	-99
SS-SINR	SS-SINR Note2		0	-3.2	-4.76	-4.76
\hat{E}_{s}/I_{ot}		dB	0	-3.2	-4.76	-4.76
IoNote2		dBm/95.04 MHz _{Note4}	-59.2 -64			
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N _{oc} to be fulfilled.					ed to be te power
Note 2:	SS-SINR, SS-RSRP, and lo level				meters for	
Note 3: Note 4: Note 5: Note 6: Note 7:	interference and noise at each receiver antenna port. te 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone te 5: As observed with 0 dBi gain antenna at the centre of the quiet zone NR operating band groups are as defined in clause 3.5.2.					
Note 8:	Void					

A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -4dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -4.5dB according to the requirements in clause 10.1.10.13.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test. The relative SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.13.1.1.

A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Danamatan	l locit	Tes	Test 1		Test 2		st 3
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD TDD TI			TE	TDD	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}	MHz	100: N	$_{RB,c} = 66$	100: N _F	RB,C = 66	100: N _F	$R_{B,C} = 66$
Downlink initial BWP configuration				DLBV	/P.0.1		
Downlink dedicated BWP configuration				DLBV			
Uplink initial BWP configuration				ULBV			
Uplink dedicated BWP configuration				ULBV			
DRX cycle configuration	ms				olicable		
TRS configuration					.1 TDD		
TCI state					tate.0		
AoA setup			Se	etup 3 defii	ned in A.3.	15	
		SR.3.1		SR.3.1		SR.3.1	
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
		00.4	00.4	00.4	00.4	00.4	00.4
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.
SMTC configuration		1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS	KIIZ	120	120	120	120	120	120
EPRE ratio of PBCH_DMRS to SSS	-						
EPRE ratio of PBCH to PBCH DMRS	-						
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH_DMRS to 333	dB	0	0	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS	-						
EPRE ratio of PDSCH_DMRS to 333							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
	ID.	0.5	0.5	44.0	44.0	0.0	0.0
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
Propagation conditions		AWGN					
Antenna configuration		1x2					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Tes	st 2	Tes	st 3
Faranietei	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
$N_{oc}^{$	dBm/15kHz Note4	-105		-105		-105	
$N_{oc}^{$	dBm/SCS Note3	-96		-96		-96	
SS-RSRP ^{Note2}	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0
$\hat{ extbf{E}}_{ extsf{s}}/ extbf{I}_{ ext{ot}}$	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-69.3		-55.4		-65.24	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in Clause 3.5.2.
- Note 7: Void Note 8: Void Note 9: Void

A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -4dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-

SINR +3.5dB to Nominal SS-SINR -4.5dB according to the requirements in clause 10.1.15.1.1 with an additional -1dB margin reflecting the possible impact of UE self noise in the test.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.7.7.4 L1-RSRP measurement for beam reporting

A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
33B configuration	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1	DLBWP.0.1
Initial BVVP Configuration	1~2		ULBWP.0.1	ULBWP.0.1
Dadia dad DMD and Carretta	4.0		DLBWP.1.3	DLBWP.1.3
Dedicated BWP configuration	1~2		ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI	4.0		TOLO:	TOLO:
Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot640	slot640
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS			17.2	17.2
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS			_	
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to	1			
SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for $\frac{N_{oc}}{}$ to be fulfilled.

Test 2 NOTE 3 Test 1 **Parameter** Config Unit SSB0 SSB1 SSB0 SSB1 Setup 1 according to Angle of arrival configuration Setup 1 according to A.3.15.1 A.3.15.1 dBm/15 1~4 -100 kHz N_{oc} 1.2 dBm/SS -91 n.a. **B SCS** 3,4 -88 n.a. \hat{E}_{a}/I_{a} 1~4 dB -2 10 n.a. -93 1,2 dBm/SC -81 As in Table B.2.4-2 SS-RSRPNote1 3,4 S -78 -90 As in Table B.2.4-2 dBm/ -51.57 Io^{Note1} 1~4 95.04M SS-RSRP+28.98 Hz \hat{E}_{s}/N_{oc} 1~4 dB 10 -2 n.a.

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Note 1: RSRP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.7.7.4.1.3 Test Requirements

After 640ms from the beginning of the test, , the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1.

The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

ĺ	Config	Description
ĺ	1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD Configuration	1		TDDConf.3.1	TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1		OP.1	OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS EPRE ratio of PDSCH DMRS to SSS	1	dB	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	'	uD		U
DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Test 2 NOTE 3 Test 1 **Parameter** Config Unit CSI-CSI-RS0 CSI-RS1 CSI-RS0 RS1 Angle of arrival configuration Setup 1 according to Setup 1 according to A.3.15.1 A.3.15.1 dBm/15 N_{oc} -100 1~2 n.a. kHz dBm/SS n.a. N_{oc} -91 1~2 **B SCS** n.a. Ê./I 1~2 dΒ -2 10 n.a. dBm/SC CSI-RS-RSRPNote1 1~2 -81 -93 As in Table B.2.4-2 S dBm/ Io^{Note1} SS-RSRP+28.98 95.04M -59.86 1~2 Hz \hat{E}_{s}/N_{oc} 1~2 dB -51.57 -2 n.a.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The reported L1-RSRP value shall include the Rx antenna gain in the range of $[-10 \sim +20]$ dB.

A.8 E-UTRA standalone tests for NR RRM

Editor notes: All NR RRM tests under E-UTRA standalone operations are included in this Annex. All EN-DC related NR RRM tests are in A.6

A.8.1 Void

A.8.2 RRC_IDLE state mobility

A.8.2.1 Inter-RAT NR Cell re-selection

A.8.2.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

A.8.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

Table A.8.2.1.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.8.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case

	Parameter		Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and during T3 period the UE reselects to cell 2
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T3
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
RF Channe	el Number		1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offset	t between cells		1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells
Access Ba	Access Barring Information		1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACE	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2, 3, 4, 5, 6	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.8.2.1.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test	Cell 2			
		configuration	T1	T2	T3	
TDD configuration		1, 4		N/A		
		2, 5		TDDConf.1.1		
		3, 6		TDDConf.2.1		
PDSCH Reference		1, 4		SR.1.1 FDD		
measurement channel		2, 5		SR.1.1 TDD		
		3, 6		SR.2.1 TDD		
RMSI CORESET		1, 4		CR.1.1 FDD		
Reference Channel		2, 5		CR.1.1 TDD	•	
		3, 6		CR.2.1 TDD		

RMC CORESET		1, 4		CCR.1.1 FDD	
Reference Channel		2, 5		CCR.1.1 TDD	
		3, 6		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1		
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1		
SSB configuration		1, 4		SSB.1 FR1	
Ü		2, 5		SSB.1 FR1	
		3, 6		SSB.2 FR1	
Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1	
configuration		, , , , ,			
Initial UL BWP		1, 2, 3, 4, 5, 6		ULBWP.0.1	
configuration					
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
Pcompensation	dB	1, 2, 3, 4, 5, 6		0	
Qhysts	dB	1, 2, 3, 4, 5, 6		0	
Qoffsets, n	dB	1, 2, 3, 4, 5, 6		0	
Cell_selection_and_		1, 2, 3, 4, 5, 6			
reselection_quality_m				SS-RSRP	
easurement					
\hat{E}_{s}/I_{ot}	dB	1, 4	-4	-infinity	12
s / Ot		2, 5			
		3, 6			
N_{oc} Note2	dBm/SCS	1, 4		-98	
oc Notes		2, 5		-98	
		3, 6		-95	
N_{oc} Note2	dBm/15 kHz	1, 4		-98	
oc notes		2, 5			
		3, 6			
\hat{E}_{s}/N_{oc}	dB	1, 4	-4	-infinity	12
<i>5</i> / <i>6 6</i>		2, 5			
		3, 6			
SS-RSRP Note3	dBm/SCS	1, 4	-102	-infinity	-86
		2, 5	-102	-infinity	-86
		3, 6	-99	-infinity	-83
lo	dBm/9.36 MHz	1, 4	-68.60	-infinity	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-infinity	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-infinity	-51.69
Treselection	S	1, 2, 3, 4, 5, 6	0	0	0
Snonintrasearch	dB	1, 2, 3, 4, 5, 6		Not sent	
Thresh _{x, high}	dB	1, 2, 3, 4, 5, 6	48		
Thresh _{serving, low}	dB	1, 2, 3, 4, 5, 6		44	
Thresh _{x, low}	dB	1, 2, 3, 4, 5, 6		50	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant

over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

T1 T2 T3	Parameter	Unit	Cell 1			
BWchannel			T1	T2	T3	
OCNG Patterns defined in TS 36.133 [15] clause A.3.2 OP.2 TDD for test configuration 1, 2, 3 OP.2 FDD for test configuration 4, 5, 6 PBCH_RA dB PBCH_RB dB PSS_RA dB PSS_RA dB PCFICH_RB dB PHICH_RA dB PDCCH_RA dB PDCCH_RB dB PDSCH_RB dB OCNG_RANOTE 1 dB Qrxlevmin dBm Noc dBm/15 kHz RSRP Note 3 dBm/15 kHz RSRP Note 3 dBm/15 kHz AB 14 14 14 14 14	E-UTRA RF Channel number			1		
clause A.3.2 OP.2 FDD for test configuration 4, 5, 6 PBCH_RA dB PBCH_RB dB PSS_RA dB SSS_RA dB PCFICH_RB dB PHICH_RA dB PDCCH_RA dB PDCCH_RB dB PDSCH_RA dB PDSCH_RB dB OCNG_RANote 1 dB Qrxlevmin dB Noc dBm/15 kHz RSRP Note 3 dBm/15 KHz RSRP Note 3 dBm/15 KHz AB 14 14 14 14 14	BW _{channel}	MHz		10		
PBCH_RA dB PBCH_RB dB PSS_RA dB SSS_RA dB PCFICH_RB dB PHICH_RA dB PHICH_RB dB PDCCH_RA dB PDCCH_RB dB PDSCH_RA dB PDSCH_RB dB OCNG_RANote 1 dB Qrxlevmin dB Noc Note 2 dBm/15 kHz RSRP Note 3 dBm/15 kHz RSRP Note 3 dBm/15 kHz B -84 -84 -84 £ s/I ot dB 14 14 14 14	OCNG Patterns defined in TS 36.133 [15]		OP.2 TDD 1	for test configura	ation 1, 2, 3;	
PBCH_RB dB PSS_RA dB SSS_RA dB PCFICH_RB dB PHICH_RA dB PHICH_RB dB PDCCH_RA dB PDCCH_RB dB PDSCH_RA dB PDSCH_RB dB OCNG_RANote 1 dB Qrxlevmin dBm Noc Note 2 dBm/15 kHz RSRP Note 3 dBm/15 KHz -84 -84 Ê _s /I _{ot} dB 14 14 14	clause A.3.2		OP.2 FDD	for test configur	ation 4, 5, 6	
PSS_RA dB SSS_RA dB PCFICH_RB dB PHICH_RA dB PHICH_RB dB PDCCH_RA dB PDCCH_RB dB PDSCH_RA dB PDSCH_RB dB OCNG_RANote 1 dB OCNG_RBNote 1 dB Qrxlevmin dBm -140 N _{oc} Note 2 dBm/15 kHz -98 RSRP Note 3 dBm/15 KHz -84 -84 Ê _s /I _{ot} dB 14 14 14	PBCH_RA	dB				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PBCH_RB	dB				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PSS_RA	dB				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SSS_RA	dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PCFICH_RB	dB				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PHICH_RA	dB		_		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PHICH_RB	dB		0		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDCCH_RB	dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDSCH_RA	dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		dB				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	OCNG_RB ^{Note 1}	dB				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Qrxlevmin	dBm		-140		
$\hat{E}_{_{s}}/I_{_{ot}}$ dB 14 14 14		dBm/15 kHz		-98		
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	RSRP Note 3	dBm/15 KHz	-84	-84	-84	
\hat{E}/M dB 14 14 14	$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$	dB	14	14	14	
E_s/V_{oc}	\hat{E}_s/N_{oc}	dB	14	14	14	
Treselection _{EUTRAN} S 0	Treselection _{EUTRAN}	S		0		
Snonintrasearch dB 50	Snonintrasearch	dB		50		
Thresh _{x, high} dB 48	Thresh _{x, high}	dB		48		
Thresh _{serving, low} dB 44	Thresh _{serving, low}	dB		44		
Thresh _{x, low} dB 50	Thresh _{x, low}	dB		50		
Propagation Condition AWGN	Propagation Condition			AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

A.8.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR} + T_{SI-NR}$,

Where:

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Thigher_priority_search See clause 4.2.2 in TS 36.133 [15]

T_{evaluate, NR} See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.8.3 RRC CONNECTED state mobility

A.8.3.1 Handover

A.8.3.1.1 E-UTRAN - NR handover in FR1

A.8.3.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements as specified in clause 6.1.2.1 specified in clause 5.3.4 in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.8.3.1.1-1. General test parameters are provided in Table A.8.3.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.8.3.1.1-3 and A.8.3.1.1-4 respectively.

Table A.8.3.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Parameter		Unit	Value	Comment		
NR RF Channel N	umber		1	1 NR carrier frequency is used in		
				the test		
LTE RF Channel N	Number		2	1 E-UTRAN carrier frequency is		
				used in the test		
Initial conditions	Active cell		Cell 1	E-UTRAN cell		
	Neighbouring cell		Cell 2	NR cell		
Final condition	Active cell		Cell 2			
NR measurement	quantity		SS-RSRP			
E-UTRAN measur	ement quantity		RSRP			
b2-Threshold1		dBm	-84	Absolute E-UTRAN RSRP		
				threshold for event B2		
b2-Threshold2NR		dBm	As specified in Table	Absolute NR SS-RSRP threshold		
			A.8.3.1.1-4	for event B2		
Hysteresis		dB	0			
TimeToTrigger		S	0			
Filter coefficient			0	L3 filtering is not used		
DRX			OFF	Non-DRX test		
Access Barring Inf	ormation	-	Not sent	No additional delays in random		
				access procedure		
Time offset between cells			3 ms	Asynchronous cells		
Gap pattern configuration Id			0	As specified in Table 8.1.2.1-1		
				started before T2 starts [15]		
T1		S	5			
T2	·	S	≤5			
T3		S	1			

Table A.8.3.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

Parameter	Unit	Configuration	Cell 1		
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		2	
Duplex mode		1, 2, 3		FDD	
		4, 5, 6		TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6		6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 2	5
			1	10 MHz: N _{RB,c} = 5	50
			2	$0 \text{ MHz}: N_{RB,c} = 1$	00
PRACH Configuration ^{Note2}		1, 2, 3		4	
		4, 5, 6		53	
PDSCH parameters:		1, 2, 3		5 MHz: R.7 FDE)
DL Reference Measurement				10 MHz: R.3 FD	_
Channel ^{Note3}				20 MHz: R.6 FD	D
		4, 5, 6		5 MHz: R.4 TDE)
				10 MHz: R.0 TD	D
				20 MHz: R.3 TD	D
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FD	D
parameters:				10 MHz: R.6 FD	D
DL Reference Measurement			2	20 MHz: R.10 FD	D
Channel ^{Note3}		4, 5, 6		5 MHz: R.11 TD	D
				10 MHz: R.6 TD	D
			2	20 MHz: R.10 TD	D
OCNG Patterns ^{Note3}		1, 2, 3	5	MHz: OP.20 FD	DD
			1	0 MHz: OP.10 FI	DD

			20) MHz: OP.17 F[DD
		4, 5, 6	Ę	MHz: OP.9 TD	D
		, ,	1	0 MHz: OP.1 TD	D
			2	0 MHz: OP.7 TD	D
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB			0	
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG_RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	7	7	7
Ê _s /I _{ot} ^{Note6}	dB	1, 2, 3, 4, 5, 6	7	7	7
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
SCH_RPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6			
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6		1x2 Low	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parameter		Unit	Configuration	Cell 2			
				T1	T2	Т3	
RF channel numb	er		1, 2, 3, 4, 5, 6		1		
Duplex mode			1, 4		FDD		
			2, 3, 5, 6		TDD		
TDD Configuration	า		2, 5		TDDConf.1.1		
			3, 6		TDDConf.1.2		
BW _{channel}		MHz	1, 4	10:	DD)		
			2, 5	10: $N_{RB,c} = 52 \text{ (TDD)}$			
			3, 6	40:	$N_{RB,c} = 106 (T)$	DD)	
PDSCH reference	measurement		1, 4		SR.1.1 FDD		
channel			2, 5		SR.1.1 TDD		
			3, 6		SR.2.1 TDD		
CORSET reference channel			1, 4	CR.1.1 FDD			
			2, 5	CR.1.1 TDD			
			3, 6	CR.2.1 TDD			
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6		OP.1		
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1		

	Dedicated DL BWP				DLBWP.1.1	
	Initial UL BWP				ULBWP.0.1	
	Dedicated UL BWP				ULBWP.1.1	
SMTC configuration			1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration			1, 2, 4, 5		SSB.1 FR1	
•			3, 6		SSB.2 FR1	
b2-Threshold2NR		dBm	1, 2, 4, 5		-105	
		abiii	3, 6		-103	
EPRE ratio of PSS	to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBC	CH_DMRS to SSS					
EPRE ratio of PBC	CH to					
PBCH_DMRS						
EPRE ratio of PDC	CCH_DMRS to					
SSS						
EPRE ratio of PDC	CCH to					
PDCCH_DMRS		dB		0		
EPRE ratio of PDSCH_DMRS to						
SSS						
EPRE ratio of PDS	SCH to					
PDSCH_DMRS	10 DMD0 / 000					
EPRE ratio of OCN						
EPRE ratio of OCN DMRS	NG to OCNG					
N _{oc} Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6	-98		
		dBm/SCS	1, 2, 3, 4, 5, 6	-98 -98		
N _{oc} Note2		ubili/000	3, 6		-95	
Ê _s /N _{oc}		dB	1, 2, 3, 4, 5, 6	-inifinit	0	0
Ê _s /I _{ot} Note3		dB	1, 2, 3, 4, 5, 6	-inifinit	0	0
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-inifinit	-98	-98
		22,000	3, 6	-inifinit	-95	-95
Io ^{Note3}		dBm/9.36 MHz	1, 2, 4, 5	-70.05	-67.04	-67.04
		dBm/38.16 MHz	3, 6	-63.96	-60.94	-60.94
Propagation condi-			1, 2, 3, 4, 5, 6		AWGN	
Antenna Configura			1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix						

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.8.3.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

 $T_{interrupt} = 210$ ms in the test; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4.3.

This gives a total of 260 ms.

A.8.4 Measurement procedure

A.8.4.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay

A.8.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX

A.8.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.1.1-1 below. Test parameters and cell-specific parameters for the NR cell are provided in Tables A.8.4.1.1.1-2 and A.8.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1.

Table A.8.4.1.1.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.1.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Parameter	Unit	Test	Value		Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel		Config	,	1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6		l	frequencies is used.
NR RF Channel		Config	,	1	One NR FR1 carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	Ce	II 1	Cell 1 is on E-UTRA RF channel
		1,2,3,4,5,6	C	11 1	number 1.
Neighbour cell		Config	Co	II 2	Cell 2 is on NR RF channel number
		1,2,3,4,5,6	Ö	11 2	1.
SMTC-SSB parameters		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 2,5	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 3,6	SSB.	2 FR1	As specified in clause A.3.10.1
CP length		Config	Nor	mal	Applicable to both cells.
-		1,2,3,4,5,6	INOI	IIIai	
DRX		Config	0	FF	DRX is not used
		1,2,3,4,5,6	Ö	F	
Frame time offset	ms	Config 1,2,3,4			Asynchronous cells.
between serving and			3	7	The timing of Cell 2 relative to the
neighbour cells					timing of Cell 1.
	μs	Config 5,6	3		Synchronous cells.
SFN offset between		Config			SFN of Cell 2 relative to SFN of
serving and neighbour		1,2,3,4,5,6	0 1		Cell 1.
cells					
T1	S	Config		1	
		1,2,3,4,5,6		1	

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2
NR RF Channel Number		Config 1,2,3,4,5,6	1
Duplex mode		Config 1,4	FDD
Duplex filode		Config 2,3,5,6	TDD
		Config 1,4	10: $N_{RB,c} = 52$
BW _{channel}	MHz	Config 2,5	10: N _{RB,c} = 52
		Config 3,6	40: N _{RB,c} = 106
TDD configuration		Config 2,5	TDDConf.1.1
		Config 3,6	TDDConf.2.1
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1
SMTC configuration defined		Config 1,4	SMTC.2
in A.3.2.11.1 and A.3.2.11.2		Config 2,3,5,6	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2,4,5	15
spacing	KHZ	Config 3,6	30
EPRE ratio of PSS to SSS	dB		
EPRE ratio of PBCH DMRS to SSS	dB		
EPRE ratio of PBCH to PBCH DMRS	dB	Config 1,2,3,4,5,6	0
EPRE ratio of OCNG DMRS to SSS Note 1	dB		
EPRE ratio of OCNG to OCNG DMRS Note 1	dB		
N _{oc} Note2	dBm/15kHz		-98
N _{oc} Note2	dDm/CCC	Config 1,2,4,5	-98
Noc	dBm/SCS	Config 3,6	-95
SS-RSRP Note 3, 4	dBm/SCS	Config 1,2,4,5	-94
33-K3KP	ubiii/SCS	Config 3,6	-91
Ê _s /I _{ot}	dB	Config 1,2,3,4,5,6	4
Ês/Noc	dB	Config 1,2,3,4,5,6	4
L - Note 3	dBm/9.36MHz	Config 1,2,4,5	-67.11
lo Note 3	dBm/38.16MHz	Config 3,6	-62.27
Propagation Condition		Config 1,2,3,4,5,6	AWGN
	L		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.1.2 E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX

A.8.4.1.2.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.2.1-1 below. Test parameters are provided in Tables A.8.4.1.2.1-2 below. Cell-specific parameters for the E-UTRA and NR cells are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1, and Table A.8.4.1.1.1-3 in clause A.8.4.1.1.1, respectively.

Table A.8.4.1.2.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Th	e UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.2.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Parameter	Unit	Test	Va	lue	Comment	
		configuration	Test 1	Test 2	_	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6		1	One E-UTRAN TDD carrier frequencies is used.	
NR RF Channel Number		Config 1,2,3,4,5,6		1	One NR FR1 carrier frequencies is used.	
Active cell		Config 1,2,3,4,5,6	Ce	ell 1	Cell 1 is on E-UTRA RF channel number 1.	
Neighbour cell		Config 1,2,3,4,5,6	Ce	ell 2	Cell 2 is on NR RF channel number 1.	
SMTC-SSB parameters		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1	
		Config 2,5	SSB.1 FR1 SSB.2 FR1		As specified in clause A.3.10.1	
		Config 3,6			As specified in clause A.3.10.1	
CP length		Config 1,2,3,4,5,6	No	rmal	Applicable to both cells.	
DRX		Config 1,2,3,4,5,6	DR	XX.4	DRX configuration as specified in clause A.3.3.4	
Frame time offset between serving and neighbour cells	ms	Config 1,2,3,4	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.	
-	μs	Config 5,6	3		Synchronous cells.	
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0 1		SFN of Cell 2 relative to SFN of Cell 1.	
T1	S	Config 1,2,3,4,5,6		1		

A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2 E-UTRA – NR Inter-RAT Measurements

A.8.4.2.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only	required to be tested in one of the supported test configurations.

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Parameter Unit Test Value		Comment		
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5,	E-UTRA cel	ll 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5,	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	s	1, 2, 3, 4, 5,	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 6	1	1	

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.1.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.1.1-4

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD)
		4, 5, 6	TDE)
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _R 10 MHz: N _I 20 MHz: N _R	RB,c = 50

	1	·			
PDSCH parameters:		1, 2, 3	5 MHz: R.		
DL Reference Measurement			10 MHz: R.3 FDD		
Channel ^{Note2}			20 MHz: R.6 FDD		
		4, 5, 6	5 MHz: R.		
			10 MHz: R		
			20 MHz: R		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:			10 MHz: R	-	
DL Reference Measurement			20 MHz: R.	10 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
			10 MHz: R	-	
			20 MHz: R.	10 TDD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP	=	
			10 MHz: OP		
			20 MHz: OP		
		4, 5, 6	5 MHz: OF	.9 TDD	
			10 MHz: OP.1 TDD		
			20 MHz: OP.7 TDD		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity 17		
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
_	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c}	
Io ^{Note5}	GBIT#3IVII IZ	1, 2, 0, 4, 0, 0		/50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU	70	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Le	DW WC	
Correlation Matrix Note6					
		e:	101 11 4 11 4 0 4 1 TC		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

st	Cell 2 T1 T2		
uration		12	
4, 5, 6	1		
4	FDI		
5, 6	TDI		
5	TDDCor		
6	TDDCor		
4, 5	10: N _{RB,0}		
6	40: N _{RB,c}	= 106	
4, 5, 6	OP.	1	
4	SMT	C.2	
5, 6	SMT	C.1	
4, 5	15		
6	30		
4, 5	-99		
6	-96		
4, 5, 6			
	0		
4, 5, 6	-98	3	
4, 5	-98	}	
6	-95)	
4, 5	-Infinity	-91	
6	-Infinity	-88	
4, 5, 6	-Infinity	7	
4, 5, 6	-Infinity	7	
4, 5	-Infinity	-65.38	
6	-Infinity	-61.06	
4.5.0	F-71 11	70	
4, 5, 6			
4, 5, 6	1x2 L	OW	
1	4, 5, 6 4, 5, 6 a constant tot		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

A.8.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configurat	ion Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The U	E is only required to be tested in one of the supported test configurations.

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configuratio n	Test 1	Test 2	Test 2	Test 4	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6		•	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1	Note 1			E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	2	11	2	11	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4							

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1	
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50	

			20 MHz: N _R	P = 100	
PDSCH parameters:		1, 2, 3	5 MHz: R.		
DL Reference Measurement		1, 2, 3	10 MHz: R		
Channel ^{Note2}			20 MHz: R	-	
Chamer		4, 5, 6	5 MHz: R.		
		4, 5, 0	10 MHz: R		
			20 MHz: R	-	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:		1, 2, 0	10 MHz: R		
DL Reference Measurement			20 MHz: R.		
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
Chainer		1, 0, 0	10 MHz: R		
			20 MHz: R.		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP	-	
OCIVO I atterns		1, 2, 0	10 MHz: OF		
			20 MHz: OP		
		4, 5, 6	5 MHz: OF		
		1, 0, 0		10 MHz: OP.1 TDD	
			20 MHz: Of		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ês/lot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50) -59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70	
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Low		
		L	<u> </u>		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	•	1
Duplex mode		1, 4	F	DD
		2, 3, 5, 6	T	DD
TDD configuration		2, 5	TDDC	onf.1.1
		3, 6	TDDC	onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _R	B,c = 52
		3, 6	40: N _{RB}	s,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ΓC.2
and A.3.11.2		2, 3, 5, 6	SM	ΓC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5
3		3, 6		0
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		99
		3, 6		96
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		-
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS			()
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
(Note 1) N oc Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-(98
Note2	dBm/SCS	1, 2, 4, 5	-6	98
oc oc		3, 6	-(95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{\mathbf{E}}_{\varsigma}/\mathbf{I}_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38
	dBm/38.16MH	3, 6	-Infinity	-61.06
	Z			
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2	Low

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm col}$ to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value		Comment	
		configurati on	Test 1	Test 2		
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6		1	One E-UTRA carrier frequency is used.	
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	One FR1 NR carrier frequency is used.	
Active cell		1, 2, 3, 4, 5,	E-UTRA ce	ell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.	
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]	
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0			
CP length		1, 2, 3, 4, 5, 6	Normal			
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0			
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used	
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used	
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.	
		2, 3, 5, 6	3µs		Synchronous cells.	
T1	S	1, 2, 3, 4, 5, 6	5			
T2	s	1, 2, 3, 4, 5,	2	1		

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.3.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.3.1-4

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1		
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	1			
Duplex mode		1, 2, 3	FDD			
		4, 5, 6	TDD			
TDD special subframe configuration ^{Note1}		4, 5, 6	6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50		

			20 MHz: N _R	P = 100		
PDSCH parameters:		1, 2, 3	5 MHz: R			
DL Reference Measurement		1, 2, 3	10 MHz: R			
Channel ^{Note2}			20 MHz: R	-		
Chamer		4, 5, 6	5 MHz: R			
		4, 5, 6	10 MHz: R			
			20 MHz: R			
PCFICH/PDCCH/PHICH		1, 2, 3				
parameters:		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD			
DL Reference Measurement			_	=		
Channel ^{Note2}		20 MHz: R.10 FDD 4, 5, 6 5 MHz: R.11 TDD				
Charmer		4, 3, 0	10 MHz: R			
			20 MHz: R.			
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP			
OCING Fatterns		1, 2, 3	10 MHz: OF			
			20 MHz: OF			
		4, 5, 6	5 MHz: OF			
		4, 5, 6	10 MHz: OI			
			20 MHz: OI			
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79			
PBCH_RA	uBiii	1, 2, 3, 4, 5, 6				
PBCH RB		1, 2, 0, 1, 0, 0				
PSS_RA						
SSS_RA						
PCFICH RB						
PHICH_RA						
PHICH_RB	dB		0			
PDCCH_RA						
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG RA ^{Note3}						
OCNG RB ^{Note3}						
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6				
Ês/lot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17		
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87		
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87		
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6				
Antenna Configuration and		1, 2, 3, 4, 5, 6				
Correlation Matrix Note6		, =, =, ., ., .,				

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Note 5: És/Iot, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 2		
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6	•		
Duplex mode		1, 4	FD)D	
•		2, 3, 5, 6	TD)D	
TDD configuration		2, 5	TDDC	onf.1.1	
•		3, 6	TDDC		
BW _{channel}	MHz	1, 2, 4, 5	10: N _R	B,c = 52	
		3, 6	40: N _{RB}		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF	P.1	
SMTC configuration defined in A.3.11.1		1, 4	SMT	C.2	
and A.3.11.2		2, 3, 5, 6	SMT		
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5	
, ,		3, 6	3		
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-6	9	
		3, 6	-9	16	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS			()	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N oc Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-9	8	
N oc Note2	dBm/SCS	1, 2, 4, 5	-6	18	
		3, 6	-9		
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91	
		3, 6	-Infinity	-88	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38	
	dBm/38.16MH z	3, 6	-Infinity	-61.06	
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70		
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2		
Note 1: OCNG shall be used such that the density is achieved for all OFDM solution. Note 2: Interference from other cells and recognitions.	symbols.		•	•	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is onl	y required to be tested in one of the supported test configurations.

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configuratio n	Test 1	Test 2	Test 2	Test 4	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6		,	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTR	A cell 1 (Po	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2	Note 2			SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3μs				Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	2	13	2	13	

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.4.1-4

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1		
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	1			
Duplex mode		1, 2, 3	FDD)		
		4, 5, 6	TDD			
TDD special subframe configuration ^{Note1}		4, 5, 6	6			
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	1		
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50		

Note 6:

			20 MHz: N _R	P = 100	
PDSCH parameters:		1, 2, 3	5 MHz: R.		
DL Reference Measurement		1, 2, 3	10 MHz: R		
Channel ^{Note2}			20 MHz: R	-	
Chamer		4, 5, 6	5 MHz: R.		
		4, 5, 0	10 MHz: R		
			20 MHz: R	-	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:		1, 2, 0	10 MHz: R		
DL Reference Measurement			20 MHz: R.		
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
Chainer		1, 0, 0	10 MHz: R		
			20 MHz: R.		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP	-	
OCIVO I atterns		1, 2, 0	10 MHz: OF		
			20 MHz: OP		
		4, 5, 6	5 MHz: OF		
		1, 0, 0	10 MHz: OF		
			20 MHz: Of		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ês/lot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70	
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 L		
		L	<u> </u>		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Ce	II 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6		1
Duplex mode		1, 4	F)D
•		2, 3, 5, 6	TE)D
TDD configuration		2, 5	TDDC	onf.1.1
3		3, 6	TDDC	onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _{RI}	B,c = 52
		3, 6	40: N _{RB}	,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ГС.2
and A.3.11.2		2, 3, 5, 6	SMT	ГС.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5
		3, 6	3	0
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-9	9
		3, 6	-9	96
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS			()
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
N oc Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-6	8
N oc Note2	dBm/SCS	1, 2, 4, 5	-6	08
oc oc		3, 6		95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38
	dBm/38.16MH	3, 6	-Infinity	-61.06
	Z	-, -		
Propagation Condition		1, 2, 3, 4, 5, 6	ETI	J70
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		Low
Matrix Note 1: OCNG shall be used such that the	cell is fully alloca			

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

A.8.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only	required to be tested in one of the supported test configurations.

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	V	alue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2		1	One E-UTRAcarrier frequency is used.
NR RF Channel Number		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA ce	ll 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1	·	SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3µs		Synchronous cells.
T1	s	1, 2	10		
T2	s	1, 2	6	3	
Note 1: The value of b	o1-Thres	holdNR is defin	ed in Table A	.8.4.2.5.1-3	

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
AoA setup defined in A.3.15.2.1		1, 2	Setup 2a	
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.	1)	1, 2	C)P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	108
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note	Э			
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
N Note2	dBm/15kHz	1, 2	-	111
N_{oc} Note2	dBm/SCS	1, 2	-	102
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	A۱	VGN

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms Test 2: D2 ms				
UE power class 3	3200	1600			

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

A.8.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.6.1-1, A.8.4.2.6.1-2 and A.8.4.2.6.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.6.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.6.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.6.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

Cor	nfiguration	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations.				

Table A.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test		Value			Comment
		configuratio n	Test 1			Test 4	
E-UTRA RF Channel Number		1, 2	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2			1		One FR2 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTR/	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dB m	1, 2	Note 1	Note 1			SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5,	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5,	0				
Filter coefficient		1, 2, 3, 4, 5,	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	6	83	6	83	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.5.1-3							

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Setup 1	
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.1	1)	1, 2	C	P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	,	-96
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note	9			
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)	-			
N Note2	dBm/15kHz	1, 2	-	111
N_{oc} Note2	dBm/SCS	1, 2	-	102
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	A۱	VGN

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)					
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 ms					
UE power class 3	4800	51200	4800	51200		

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

A.8.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.7.1-1, A.8.4.2.7.1-2 and A.8.4.2.7.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.7.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.7.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.7.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

Configuration Description					
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations.				

Table A.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	V	alue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Numbers		1, 2		1	One E-UTRA carrier frequency is used.
NR RF Channel Numbers		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA ce	II 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3µs		Synchronous cells.
T1	S	1, 2	5		
T2	S	1, 2	5	3	
Note 1: The value of b	o1-Thres	holdNR is defin	ed in Table A	.8.4.2.5.1-3	•

Table A.8.4.2.7.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2		
		configuration	T1	T2	
AoA setup defined in A.3.15.1		1, 2	Setup 1		
NR RF Channel Number		1, 2	1		
Duplex mode		1, 2		DD	
TDD configuration		1, 2	TDD	Conf.3.1	
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$	
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	C	P.1	
SMTC configuration defined in A.3.11.1		1	SM	ITC.2	
and A.3.11.2		2	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	,	-96	
EPRE ratio of PSS to SSS		1, 2			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS				0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
N oc Note2	dBm/15kHz	1, 2	-	111	
N oc Note2	dBm/SCS	1, 2	-102		
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity -88		
	dBill/SCS			-00 14	
\hat{E}_{s}/I_{ot}		1, 2	-Infinity		
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14	
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84	
	Z				
Propagation Condition		1, 2	A۱	VGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms			
UE power class 3	4160	2080			

A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Cor	nfiguration	Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only required to be tested in one of the supported test configurations.			

Table A.8.4.2.8.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment	
		configuratio	Test	Test 2	Test	Test 4	
		n	1		3		
E-UTRA RF Channel Number		1, 2	1			One E-UTRA carrier frequency is used.	
NR RF Channel Number		1, 2			1		One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0			As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2	39 19			As specified in TS 36.331 [16].	
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	S	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX			DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms			Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
cells		2	3µs				Synchronous cells.
T1	s	1, 2	5				
T2	s	1, 2	7	70	7	70	
Note 1: The va	lue of b1-	ThresholdNR is	defined i	in Table A.8	3.4.2.5.1·	-3	

Table A.8.4.2.8.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Setup 1	
NR RF Channel Number		1, 2	1	
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD0	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 ((OP.1)	1, 2	C	P.1
SMTC configuration defined in A.3.1	1.1	1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120
b1-ThresholdNR UE power cla	ss 3 dBm/SCS	1, 2		-96
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS	3			
EPRE ratio of PDCCH DMRS to SSS	3			
EPRE ratio of PDCCH to PDCCH DN	/IRS			
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS	(Note			
1)				
EPRE ratio of OCNG to OCNG DMR	S			
(Note 1)				
N Note2	dBm/15kHz	1, 2	-	111
N Note2	dBm/SCS	1, 2	-	102
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

Table A.8.4.2.8.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms	Test 3: D3 ms	Test 4: D4 ms	
UE power class 3	6240	66560	6240	66560	

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.5 Measurement performance

A.8.5.1 SFTD accuracy

A.8.5.1.1 SFTD accuracy

A.8.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT FR1 SFTD measurements.

A.8.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.8.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR FR1 target cell. The test parameters of cell 1 are given in clause A.8.5.1.1.2-2. The test parameters of cell 2 are given in Table A.8.5.1.1.2-3. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.8.5.1.1.2-4.

Table A.8.5.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD		
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD		
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD		
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.8.5.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Unit	Test 1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD

TDD and side subframe configuration Note1	1	6
TDD special subframe configuration Note1		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}		5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
PROCES.		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
DOELO LIDE O OLLI PLI II OLLI		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
OONO P (1 Note2	-	20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
DDOLL DA	JD	20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104
Ê _s /N _{oc}	dB	-3
Ê _s /I _{ot}	dB	-3
RSRP Note5	dBm/15 kHz	-107
SCH_RP Note5	dBm/15 kHz	-107
Io Note5	dBm/Ch BW	-74.45
		+10log
		(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
Note 1: Special subframe and uplink-down	nlink configuration	s are specified in table 4.2-1 in TS 36.211 [23].

Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] Note 1:

Note 2:

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Interference from other cells and noise sources not specified in the test is assumed to be constant Note 4: over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 5: Es/lot, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.5.1.1.2-3: Test parameters for SFTD accuracy (Cell 2)

	Parameter	Config	Unit	Test 1
SSB GSCN		1~6	J	freq1
002 000.				FDD
Duplex mo	Duplex mode		_	TDD
2 0 10 11 11 10				TDD
		3,6 1,4		N/A
TDD Config	guration	2,5		TDDConf.1.1
TDD Oomi	garation	3,6		TDDConf.2.1
		1,4		10: N _{RB,c} = 52
BW _{channel}		2,5	MHz	10: N _{RB,c} = 52
DVVcnannei		3,6	1711 12	40: N _{RB,c} = 106
		1,4		SR.1.1 FDD
PDSCH Re	eference measurement	2,5		SR.1.1 TDD
channel		3,6		SR.2.1 TDD
		1,4		CR.1.1 FDD
DMCI COD	ESET Reference Channel	2,5	1	CR.1.1 TDD
KIVISI COR	ESET Reference Channel			
		3,6		CR.2.1 TDD
DMC CCC	CCCT Deference Charact	1,4	1	CCR.1.1 FDD
KIVIC COR	ESET Reference Channel	2,5	-	CCR.1.1 TDD CCR.2.1 TDD
		3,6		
000 "		1,4		SSB.1 FR1
SSB config	uration	2,5		SSB.1 FR1
01470		3,6		SSB.2 FR1
SMTC conf		1~6		SMTC.1
	onfiguration	1~6		DLBWP.1.1
	onfiguration	1~6		ULBWP.1.1
OCNG Pat		1~6		OP.1
	EPRE ratio of PSS to SSS			
	of PBCH DMRS to SSS			
	of PBCH to PBCH DMRS			
	of PDCCH DMRS to SSS			
EPRE ratio	of PDCCH to PDCCH			
DMRS				
	of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio	of PDSCH to PDSCH			
DMRS				
EPRE ratio	of OCNG DMRS to SSS ^{Note}			
1				
	of OCNG to OCNG DMRS			
Note 1				
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
$N_{oc}^{ m Note2}$	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
1 V _{oc}	NR_TDD_FR1_D	1~0	UDIII/ IOKIIZ	-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
ļ	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
N/ Note?	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	4045	dBm/SSB SCS	404
$N_{oc}^{ m Note2}$	NR_FDD_FR1_D,	1,2,4,5		-104
	NR_TDD_FR1_D			
	NR FDD FR1 E,	-		
	NR_TDD_FR1_E			
	· · · · _ · D D _ · · · · · _ E	l	İ.	

	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5	-		
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	3,6		-101
	NR_TDD_FR1_D	3,0		101
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
- /	NR_FDD_FR1_H			
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		1~6	dB	-3
\hat{E}_{s}/N_{oc}		1~6	dB	-3
3 7 00	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	1		
	NR_TDD_FR1_C	1		
	NR_FDD_FR1_D,	4045		407
	NR_TDD_FR1_D	1,2,4,5		-107
	NR_FDD_FR1_E,		dD to /CCC	
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
SS-RSRP	NR_FDD_FR1_H			
Note3	NR_FDD_FR1_A,		dBm/SCS	
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	3,6		-104
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_TDD_FR1_D	.,_,.,		14.20
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H	1	-	
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5	4		
	NR_FDD_FR1_B	-		
	NR_TDD_FR1_C	-	dPm/20 16	
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6	dBm/38.16 MHz	-68.18
	NR_FDD_FR1_E,	1	IVII IZ	
	NR TDD FR1 E			
	NR FDD FR1 G	-		
	NR_FDD_FR1_H	1		
Propagation		1~6	1	AWGN
Antenna co		1~6		1x2
	<u> </u>	·	ı	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.8.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.8.5.2 E-UTRA – NR Inter-RAT Measurement Performance requirements

A.8.5.2.1 SS-RSRP

A.8.5.2.1.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR1 SS-RSRP measurements.

A.8.5.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.1.1.2-2.

Table A.8.5.2.1.1.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations				

Table A.8.5.2.1.1.2-2: SS-RSRP inter-RAT test parameters

Parameter		Unit		st 1		st 2 ell 2
SSB ARFCN			!	Cell 2 Cell 3 freq1 freq1		
Duplex mode	Config 1,4				DD	79.
Duplex mode	Config 2,3,5,6				DD	
	Config 1,4		Not Applicable			
TDD configuration	Config 2,5		TDDConf.1.1			
	Config 3,6			TDDC	Conf.2.1	
Downlink initial BWP co	nfiguration			DLB\	NP.0.1	
Downlink dedicated BW					WP.1.1	
Uplink initial BWP config	guration			ULB\	WP.0.1	
Uplink dedicated BWP of	onfiguration			ULB\	WP.1.1	
DRX Cycle configuration	1	ms		Not Ap	plicable	
	Config 1,4			TRS.1	I.1 FDD	
TRS configuration	Config 2,5			TRS.1	1.1 TDD	
	Config 3,6			TRS.1	.2 TDD	
	Config 1,4					
PDSCH Reference measurement channel	Config 2,5			-		-
	Config 3,6					
	Config 1,4					
RMSI CORESET Reference Channel	Config 2,5			-		-
	Config 3,6					
	Config 1,4					
Dedicated CORESET Reference Channel	Config 2,5			-		-
	Config 3,6					
OCNG Patterns				OP.1		
SS-RSSI-Measurement				Not Applicable		
SMTC configruation				SM	TC.1	
000 (1 11	Config 1,2,4,5			SSB	.1 FR1	
SSB configuration	Config 3,6	7		SSB	.2 FR1	
PDSCH/PDCCH	Config 1,2,4,5				15	
subcarrier spacing	Config 3,6	kHz	30			
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS		_				
EPRE ratio of PBCH to PBCEPRE ratio of PDCCH DMI		dB	0	0	0	0
EPRE ratio of PDCCH to P						
EPRE ratio of PDSCH DMF	RS to SSS	\exists				
EPRE ratio of PDSCH to P						

EPRE ratio	of OCNG DMR	S to SSS(Note 1)			
		CNG DMRS (Note 1)			
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-117
		NR_FDD_FR1_B			-116.5
$N_{\it oc}$ Note2	Config	NR_TDD_FR1_C	dBm/15k		-116
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	Hz	-94.65	-115.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-115
		NR_FDD_FR1_G NR_FDD_FR1_H			-114 -113.5
					Same as Noc for
	Config 1,2,4	,5		-94.65	15kHz
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-114
		NR_FDD_FR1_B	4D~~/CC		-113.5
$N_{oc}^{\rm Note2}$		NR_TDD_FR1_C	dBm/SC S		-113
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-91.65	-112.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-112
		NR_FDD_FR1_G NR_FDD_FR1_H			-111 -110.5
Ê _s /I _{ot}		NIN_I DD_I INI_II	dB	10	-110.5
\hat{E}_{s}/N_{oc}			dB	10	-4
E _s /N _{oc}		ND EDD ED1 A	uБ	10	-4
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-121
		NR_FDD_FR1_B]		-120.5
	Config	NR_TDD_FR1_C			-120
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D		-84.65	-119.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-119
		NR_FDD_FR1_G			-118
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SC		-117.5
e3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	S		-124
		NR_FDD_FR1_B			-123.5
		NR_TDD_FR1_C			-123
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-81.65	-122.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-122
		NR_FDD_FR1_G			-121
		NR_FDD_FR1_H NR_FDD_FR1_A			-120.5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-87.76
	Config	NR_FDD_FR1_B	dBm/		-87.26
Io ^{Note3}	1,2,4,5	NR_TDD_FR1_C	9.36MHz	-56.28	-86.76
	, , ,-	NR_FDD_FR1_D NR_TDD_FR1_D			-86.26
		NR_FDD_FR1_E NR_TDD_FR1_E			-85.76

		NR_FDD_FR1_G			-84.76
		NR_FDD_FR1_H			-84.26
		NR_FDD_FR1_A			
		NR_TDD_FR1_A			-84.76
		NOTE 6			
		NR_FDD_FR1_B			-84.26
		NR_TDD_FR1_C	dBm/		-83.76
	Config 3,6	NR_FDD_FR1_D	38.16MH	-50.19	-83.26
		NR_TDD_FR1_D	z		-03.20
		NR_FDD_FR1_E			-82.76
		NR_TDD_FR1_E			-02.70
		NR_FDD_FR1_G]		-81.76
		NR_FDD_FR1_H			-81.26
Propagati	on condition		-	AW	/GN
Antenna o	configuration		-	1	x2
Note 1:	OCNG shall b	e used such that both	cells are ful	ly allocated and a co	nstant total
	transmitted po	ower spectral density i	s achieved for	or all OFDM symbols	S.
Note 2:	Interference f	rom other cells and no	ise sources	not specified in the t	est is assumed to
	be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.				
Note 3:	·	, c	dariyad fran	other parameters for	or information
INULE 3.	SS-RSRP, and lo levels have been derived from other parameters for information				

SS-RSRP minimum requirements are specified assuming independent interference and

The test configuration excludes support for band n51 and it is not required to run this

Note 4:

Note 5:

Note 6:

A.8.5.2.1.1.3

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.1.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

purposes. They are not settable parameters themselves.

NR operating band groups are as defined in clause 3.5.2.

test on band n51 in this release of the specification.

noise at each receiver antenna port.

Test Requirements

A.8.5.2.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR2 SS-RSRP measurements.

A.8.5.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-RSRP inter-RAT measurement are tested by using test setup in Table A.8.5.2.1.2.2-2 and Table A.8.5.2.1.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.1.2.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.1.2.2-2: SS-RSRP Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2		
raiailletei	Oilit	Cell 2	Cell 2		
SSB ARFCN		Freq1	freq1		
Duplex mode		TDD	TDD		
TDD configuration		TDDConf.3.1	TDDConf.3.1		
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66		
Downlink initial BWP configuration		DLBW	/P.0.1		
Downlink dedicated BWP configuration		DLBW			
Uplink initial BWP configuration		ULBW	/P.0.1		
Uplink dedicated BWP configuration		ULBW	/P.1.1		
DRX cycle configuration	ms		olicable		
TRS configuration		TRS.2	.1 TDD		
TCI state		TCI.S	tate.0		
PDSCH Reference measurement channel		-	-		
RMSI CORESET Reference Channel		-	-		
OCNG Patterns		OP.1	OP.1		
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2		
PDSCH/PDCCH subcarrier spacing	kHz	120	120		
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0		
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS ^{Note 1}					
\hat{E}_s/N_{oc}	dB	10	N/A		
Note 1: OCNG shall be used such that bo			stant total		
transmitted power spectral density is achieved for all OFDM symbols.					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be					

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

Parameter		Unit	Test 1	Test 2
		Onit	Cell 2	Cell 2
			Setup 1	Setup 1
Angle of arrival configuration			according to	according to
			A.3.15.1	A.3.15.1
	NR_TDD_FR2_A			N/A
N Note1	NR_TDD_FR2_B		-100	N/A
oc .	NR_TDD_FR2_F	dBm/15kHz		N/A
	NR_TDD_FR2_G	Note4		N/A
	NR_TDD_FR2_T			N/A
	NR_TDD_FR2_Y			N/A
N Note1	NR_TDD_FR2_A			N/A
oc	NR_TDD_FR2_B	dBm/SCS	06	N/A
	NR_TDD_FR2_F	Note3	-96	N/A
	NR_TDD_FR2_G			N/A

	NR_TDD_FR2_T			N/A
	NR_TDD_FR2_Y			N/A
	NR_TDD_FR2_A			Note7
SS-RSRP ^{Note2}	NR_TDD_FR2_B			Note7
	NR_TDD_FR2_F	dBm/SCS	0.5	Note7
	NR_TDD_FR2_G	Note4	-85	Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
\hat{E}_s/I_{ot}		dB	11	N/A
	NR_TDD_FR2_A			Note8
	NR_TDD_FR2_B			Note8
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	EE 1	Note8
	NR_TDD_FR2_G	MHz Note4	-55.4	Note8
	NR_TDD_FR2_T			Note8
	NR_TDD_FR2_Y			Note8

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\alpha c}$ to be fulfilled.
- Note 2: SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: SS_RSRP is applied at level the same as the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: Io is applied at level 10log₁₀(792) dB above the minimum level specified in Table B.2.3-2 for sphereical coverage

A.8.5.2.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.2 SS-RSRQ

A.8.5.2.2.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR1 SS-RSRQ measurements.

A.8.5.2.2.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.2.1.2-2.

Table A.8.5.2.2.1.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations				

Table A.8.5.2.2.1.2-2: SS-RSRQ inter-RAT test parameters

Parame	Parameter		Tes			st 2		st 3 ell 2
SSB ARFCN			Cell 2 Cell 2 Cell 2 freq1 freq1 freq					
	Config 1,4		1100	1'		DD		7 9 ·
Duplex mode	Config 2,3,5,6		TDD					
	Config 1,4		Not Applicable					
TDD configuration	Config 2,5				TDDC	Conf.1.1		
	Config 3,6	7	TDDConf.2.1					
Downlink initial BWP cor	nfiguration				DLB\	WP.0.1		
Downlink dedicated BWI	configuration				DLB\	WP.1.1		
Uplink initial BWP config						WP.0.1		
Uplink dedicated BWP c	onfiguration				ULB\	WP.1.1		
DRX Cycle configuration		ms			Not Ar	plicable		
2. b. c. c. c. c. c. c. c. c. c. c. c. c. c.	Config 1,4					1.1 FDD		
TRS configuration	Config 2,5					1.1 TDD		
2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Config 3,6					.2 TDD		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5		-			-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5		-			-		-
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5		-			-		-
	Config 3,6							
OCNG Patterns					0	P.1		
SS-RSSI-Measurement					Not Ap	plicable		
SMTC configruation					SM	TC.1		
SSB configuration	Config 1,2,4,5				SSB	.1 FR1		
33D Configuration	Config 3,6		SSB.2 FR1					
PDSCH/PDCCH	Config 1,2,4,5					15		
subcarrier spacing	Config 3,6	kHz				30		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PDSCH to PI EPRE ratio of OCNG DMRS								

EDDE rotio	of OCNIC to OC	NG DMRS (Note 1)		<u> </u>	Т	T
EFRE IAIIO	OF OCING 10 OC					
N oc Note2	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H 55 NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k Hz	-80.18 -80.18	-106 -106	-116 -115.5 -115 -114.5 -114 -113 -112.5 Same as Noc for 15kHz
N oc Note2	Config 3,6	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SC S	-83.27	-110	-113 -112.5 -112 -111.5 -111 -110 -109.5
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		dB	-1.75	-1.75	-1.75	
\hat{E}_s/N_{oc}		dB	-1.75	-1.75	-1.75	
SS- RSRP ^{Not}	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G	dBm/SC	-81.93	-107.75	-117.75 -117.25 -116.75 -116.25 -115.75 -114.75 -114.25
e3	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	S	-85.02	-111.75	-114.75 -114.25 -113.75 -113.25 -112.75 -111.75 -111.25
SS-RSRQ	Note3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-40.59	-14.76

		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	- dBm/			-85.83	
		NR_FDD_FR1_B		-50	-75.83	-85.33	
	Config	NR_TDD_FR1_C				-84.83	
	Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz			-84.33	
		NR_FDD_FR1_E NR_TDD_FR1_E	- - - -			-83.83	
		NR FDD FR1 G				-82.83	
Io ^{Note3}		NR_FDD_FR1_H				-82.33	
10,1000		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/ 38.16MH z	-50	-79 -78 -76 73	-79.73	
		NR_FDD_FR1_B				-79.23	
		NR_TDD_FR1_C				-78.73	
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D				-78.23	
		NR_FDD_FR1_E NR_TDD_FR1_E				-77.73	
		NR_FDD_FR1_G				-76.73	
		NR_FDD_FR1_H				-76.53	
	Propagation condition		-		AWGN		
	onfiguration		-	1x2			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

A.8.5.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-RAT measurement are tested by using test setup in Table A.8.5.2.2.2.2-2 and Table A.8.5.2.2.2.3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.2.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.8.5.2.2.2-2: SS-RSRQ Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	
Parameter	Onit	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	
Downlink initial BWP configuration		DLBV	/P.0.1	
Downlink dedicated BWP configuration		DLBV	/P.1.1	
Uplink initial BWP configuration			/P.0.1	
Uplink dedicated BWP configuration		ULBV	/P.1.1	
DRX cycle configuration	ms		olicable	
TRS configuration		TRS.2	.1 TDD	
TCI state		TCI.S	tate.0	
PDSCH Reference measurement channel		-	-	
RMSI CORESET Reference Channel		-	-	
OCNG Patterns		OP.1	OP.1	
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
\hat{E}_s/N_{oc}	dB	-0.5	-1.75	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{_{oc}}$ to be fulfilled.

Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.2.2.2-3: SS-RSRQ Inter-RAT OTA related test parameters

Parameter		Unit	Test 1	Test 2
		Unit	Cell 2	Cell 2
			Setup 1	Setup 1
Angle of arrival con	figuration		according to	according to
			A.3.15.1	A.3.15.1
	NR_TDD_FR2_A			Note7
	NR_TDD_FR2_B			Note7
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz ^N	-105	Note7
	NR_TDD_FR2_G	ote4	-105	Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
	NR_TDD_FR2_A			Note7
	NR_TDD_FR2_B			Note7
N oc Note1	NR_TDD_FR2_F	dBm/SCS ^{Note}	-96	Note7
	NR_TDD_FR2_G	3	-90	Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
	NR_TDD_FR2_A		-96.5	Note8
	NR_TDD_FR2_B			Note8
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS		Note8
33-K3KP*****	NR_TDD_FR2_G	Note4		Note8
	NR_TDD_FR2_T			Note8
	NR_TDD_FR2_Y			Note8
	NR_TDD_FR2_A			-14.82
	NR_TDD_FR2_B			-14.82
SS-RSRQ ^{Note2}	NR_TDD_FR2_F	dB	-14.4	-14.82
33-K3KQ*****	NR_TDD_FR2_G	uБ	-14.4	-14.82
	NR_TDD_FR2_T			-14.82
	NR_TDD_FR2_Y			-14.82
Ê _s /I _{ot}		dB	-0.5	-1.75
	NR_TDD_FR2_A			Note 9
	NR_TDD_FR2_B			Note 9
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04	62.0	Note 9
10,1002	NR_TDD_FR2_G	MHz Note4	-63.9	Note 9
	NR_TDD_FR2_T			Note 9
	NR_TDD_FR2_Y			Note 9

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 2: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: N_{oc} for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. N_{oc} for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 2.25dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 9: Io is applied at level 10log₁₀(792)+6.22dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

A.8.5.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

In this test case there are two cells on different carriers and measurement gaps are provided

A.8.5.2.3 SS-SINR

A.8.5.2.3.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR1 SS-SINR measurements.

A.8.5.2.3.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.3.1.2-2.

Table A.8.5.2.3.1.2-1: SS- SINR Inter-RAT SS- SINR supported test configurations

Config Description					
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: T	ote: The UE is only required to be tested in one of the supported test configurations				

Table A.8.5.2.3.1.2-2: SS-SINR inter-RAT test parameters

Parameter		Unit	Test 1	Test 2	Test 3
Parame	eter	Onn	Cell 2	Cell 2	Cell 2
SSB ARFCN			freq1	freq1	freq1
Duplex mode	Config 1,4		FDD		
Duplex mode	Config 2,3,5,6			TDD	
	Config 1,4			Not Applicable	
TDD configuration	Config 2,5			TDDConf.1.1	
	Config 3,6			TDDConf.2.1	
Downlink initial BWP cor	nfiguration			DLBWP.0.1	
Downlink dedicated BW	P configuration		DLBWP.1.1		
Uplink initial BWP config	juration		ULBWP.0.1		
Uplink dedicated BWP c	onfiguration		ULBWP.1.1		
DRX Cycle configuration	1	ms	Not Applicable		
	Config 1,4			TRS.1.1 FDD	
TRS configuration	Config 2,5		TRS.1.1 TDD		
	Config 3,6			TRS.1.2 TDD	
	Config 1,4				
PDSCH Reference measurement channel	Config 2,5		-	-	-
	Config 3,6				

		1		1				1		
		Config 1,4								
RMSI COR Reference		Config 2,5			-		-		-	
		Config 3,6								
		Config 1,4								
Dedicated Reference	CORESET Channel	Config 2,5			-		-		-	
		Config 3,6								
OCNG Pat	terns					0	P.1			
SS-RSSI-N	/leasurement					Not Ap	plicable			
SMTC con	figruation					SM	TC.1			
		Config 1,2,4,5				SSB	.1 FR1			
SSB config	juration	Config 3,6				SSB	2 FR1			
PDSCH/PI	OCCH	Config 1,2,4,5					15			
subcarrier		Config 3,6	kHz				30			
EPRE ratio	of PSS to SS	SS								
	of PBCH DM					0 0	0	0		
	of PBCH to I									
	of PDCCH D				_				_	
		PDCCH DMRS	dB	0	0				0	
	of PDSCH Do of PDSCH to		4							
EPRE ratio	of OCNG DA	MRS to SSS ^(Note 1)	-							
EPRE ratio	of OCNG to	OCNG DMRS (Note 1)	1							
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						[-119.5]		
		NR_FDD_FR1_B	1					[-1	19]	
Nervo	Config	NR_TDD_FR1_C	dBm/15k						18.5]	
N_{oc}^{Note2}	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	Hz	[-80]		[-108.5]		[-118]		
		NR_FDD_FR1_E NR_TDD_FR1_E	<u>.</u>						[-117.5]	
		NR_FDD_FR1_G						[-116.5]		
		NR_FDD_FR1_H						[-116]		
	Config 1,2,4	,5		3-]	30]	[-10	8.5]		s Noc for kHz	
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							16.5]	
$N_{oc}^{\rm Note2}$		NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SC						16] 15.5]	
oc oc	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	- S	[-77]		[-10	[-105.5]		15]	
		NR_FDD_FR1_E NR_TDD_FR1_E							14.5]	
		NR_FDD_FR1_G							14.5]	
	NR_FDD_FR1_H			[475]		1007		[-113]		
	Ê _s /I _{ot}				.75]		.0]		1.0]	
\hat{E}_{s}/N_{oc}			dB	[-1.	.75]	[2	:0]	[-4	4.0]	

		T	1		ı	
SS- RSRP ^{Not} e3	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_C	dBm/SC S	[-81.75]	[-88.5]	[-123.5] [-123] [-122.5] [-122] [-121.5] [-120.5] [-120] [-120.5] [-120.5]
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H		[-78.75]	[-85.5]	[-119] [-118.5] [-117.5] [-117]
	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B					
SS-SINR N	ote3	NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	[-1.75]	[20]	[-4.0]
	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G	dBm/ 9.36MHz	[-49.83]	[-60.5]	[-90.09] [-89.59] [-89.09] [-88.59] [-88.09] [-87.09]
Io ^{Note3}	Config 3,6	NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/ 38.16MH z	[-43.73]	[-54.41]	[-86.59] [-84] [-83.5] [-83] [-82.5] [-82] [-81] [-80.5]
Propagation condition			-		AWGN	[[00.0]
	onfiguration		-		1x2	
			1	ı		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-RAT measurement are tested by using test setup in Table A.8.5.2.3.2.2-2 and A.8.5.2.3.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.3.2.2-1: SS-SINR Inter-RAT SS-SINR supported test configurations

Configuration	Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.8.5.2.3.2.2-2: SS-SINR Inter-RAT general test parameters

Dovemeter	l lmit	Test 1	Test 2	Test 3		
Parameter	Unit	Cell 2	Cell 2	Cell 2		
SSB ARFCN		Freq1	freq1	freq1		
Duplex mode		TDD	TDD	TDD		
TDD configuration		TDDConf.3.1	TDDConf.3.1	TDDConf.3.1		
BW _{channel}	MHz	100: N _{RB,c} = 66	100: $N_{RB,c} = 66$	100: N _{RB,c} = 66		
Downlink initial BWP configuration			DLBWP.0.1			
Downlink dedicated BWP configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP configuration			ULBWP.1.1			
DRX cycle configuration	ms		Not applicable			
TRS configuration		TRS.2.1 TDD				
TCI state		TCI.State.0				
PDSCH Reference measurement channel		-	-	-		
RMSI CORESET Reference Channel		-	-	-		
OCNG Patterns		OP.1	OP.1	OP.1		
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2		
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120		
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0		
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS ^{Note 1}						
\hat{E}_s/N_{oc}	dB	-0.5	11.0	-3.0		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.2.3.2.2-3: SS-SINR Inter-RAT OTA related test parameters

D-		Unit	Test 1	Test 2	Test 3
Pa	ırameter	Unit	Cell 2	Cell 2	Cell 2
			Setup 1	Setup 1	Setup 1
Angle of arrival configuration			according to	according to	according to
			A.3.15.1	A.3.15.1	A.3.15.1
	NR_TDD_FR2_A				Note7
	NR_TDD_FR2_B				Note7
N Note1	NR_TDD_FR2_F	dBm/15kHz	-105	-105	Note7
	NR_TDD_FR2_G	Note4	-105	-105	Note7
	NR_TDD_FR2_T				Note7
	NR_TDD_FR2_Y				Note7
	NR_TDD_FR2_A				Note7
	NR_TDD_FR2_B				Note7
N oc Note1	NR_TDD_FR2_F	dBm/SCS	-96	-96	Note7
	NR_TDD_FR2_G	Note3			Note7
	NR_TDD_FR2_T				Note7
	NR_TDD_FR2_Y				Note7
	NR_TDD_FR2_A	dBm/SCS			Note8
	NR_TDD_FR2_B		-96.5	-85	Note8
CC DCDDNote2	NR_TDD_FR2_F				Note8
SS-RSRP ^{Note2}	NR_TDD_FR2_G	Note4			Note8
	NR_TDD_FR2_T				Note8
	NR_TDD_FR2_Y				Note8
	NR_TDD_FR2_A				-3.0
	NR_TDD_FR2_B				-3.0
SS-SINR ^{Note2}	NR_TDD_FR2_F	dB	-0.5	11	-3.0
33-3INK 1862	NR_TDD_FR2_G	uБ	-0.5	11	-3.0
	NR_TDD_FR2_T				-3.0
	NR_TDD_FR2_Y				-3.0
\hat{E}_s/I_{ot}		dB	-0.5	11	-3.0
	NR_TDD_FR2_A				Note9
	NR_TDD_FR2_B]			Note9
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	00.0	FE 4	Note9
10,10,62	NR_TDD_FR2_G	MHz Note4	-69.3	-55.4	Note9
	NR_TDD_FR2_T	1			Note9
	NR_TDD_FR2_Y	1			Note9

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: N_{oc} for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. N_{oc} for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 3dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

 Note 9: Io is applied at level 10log₁₀(792)+6.54dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

A.8.5.2.3.2.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

Annex B (normative):

Conditions for RRM requirements applicability for operating bands

B.1 Conditions for NR RRC_IDLE state mobility

B.1.1 Introduction

In Annex B.1, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR FDD FR1 H	-120.5	-117.5	

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

		NR		Minimum SSB_RP Note 2, Note 3 dBm / SCS _{SSB}					
Parameter	Angle of arrival	operating bands		SCS _{SSB} =	= 120 kHz		SCS _{SSB} = 240 kHz	dB	
				UE Pow	er class		UE Power class		
			1	2	3	4	1, 2, 3, 4		
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
	Rx Beam Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	kHz) +3dB	≥-4	
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄			
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			
	Spherical	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120		
	coverage Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB		
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.
- NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.1.2-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This clause defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this clause.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this clause.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

B.2.1.1 General

In Annex B.2, the following conditions are specified:

- The conditions for RRC connection release with redirection to NR requirements in clause 6.2.3.2.1,
- The conditions for UE transmit timing adjustment in clause 7.1,
- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 9, UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in clause 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in clause 10.

B.2.1.2 Derivation of Minimum SSB RP values for FR1

[FFS]

B.2.1.3 Derivation of Minimum SSB_RP values for FR2

B.2.1.3.1 Minimum SSB_RP values for Rx Beam Peak angle of arrival

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = Reference sensitivity $_{PC3,\ n260,\ 50MHz}$ +Y -10Log $_{10}(PRB_{Refsens}\ x\ 12)$ - SNR $_{Refsens}$ + SSB $\hat{E}s/Iot$ + ΣMB_P where:

Reference sensitivity PC3, n260, 50MHz is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE power class									
1 2 3 4									
FFS	9.0	FFS 9.0 7.0 FFS							

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32:

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

 ΣMB_P is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-109.5 + \Sigma MB_P)$ dBm/120kHz for intra-frequency measurements and $(-107.5 + \Sigma MB_P)$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

 $For \ Intra-frequency: \ Minimum \ SSB_RP \ (PC_X, \ Band_Y) = -109.5 \ dBm/120kHz + Refsens_{PC_X, \ Band_Y, \ 50MHz} - Refsens_{PC_X,$

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = -107.5 dBm/120kHz + Refsens $_{PC_X, Band_Y, 50MHz}$ - Refsens $_{PC_3, n260, 50MHz}$ + $Y_{PC_3, n260, 50MHz}$

B.2.1.3.2 Minimum SSB RP values for angle of arrival within Spherical coverage

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = EIS spherical coverage $_{PC3,\ n260,\ 50MHz}$ +Z - $10Log_{10}(PRB_{Refsens}\ x\ 12)$ - $SNR_{Refsens}$ + $SSB\ \hat{E}s/Iot$ + ΣMB_s .

where:

EIS spherical coverage PC3, n260, 50MHz is the EIS spherical coverage value in dBm specified for power class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1;

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1;

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

Value "Z" in dB, for each UE power class							
1 2 3 4							
FFS 9.0 7.0 FFS							

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

 ΣMB_S is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-96.9 + \Sigma MB_S)$ dBm/120kHz for intra-frequency measurements and is $(-94.9 + \Sigma MB_S)$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = (-103.9+ Σ MB_S +Z) dBm/120 kHz + Refsens PC_X, Band_Y, $_{50MHz}$ - Refsens PC_3, $_{n260,\ 50MHz}$ + Z PC_X - Z PC_3 + Σ MB_S,

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = (-101.9+ Σ MB_S +Z) dBm/120 kHz + Refsens PC_X, Band_Y, 50MHz - Refsens PC_3, n260, 50MHz + Z PC_X - Z PC_3 + Σ MB_S

B.2.1.4 Gain to SS-RSRP measurement point for FR1

In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP measurement point.

B.2.1.5 Gain to SS-RSRP measurement point for FR2

B.2.1.5.1 Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

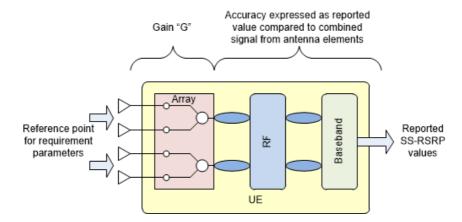


Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

	UE Power class							
	1 2 3 4							
Minimum, dBi	FFS	FFS	-10	FFS				
Maximum, dBi	FFS	FFS	+20	FFS				

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

			SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
i arameter	Nit operating band groups	SCS _{SSB} = 15	SCS _{SSB} = 30	dB
		kHz	kHz	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	
	NR_FDD_FR1_B	-126.5	-123.5	
Conditions	NR_TDD_FR1_C	-126	-123	> 0
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	≥ -6
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	
	NR_FDD_FR1_G	-124	-121	
	NR_FDD_FR1_H	-123.5	-120.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.	•	

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

				Minimum SSB_RP Note 2, Note 3					
		NR			dBm / SC	Sssb			
Parameter	Angle of arrival	Angle of operating		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	-ID	
		bands		UE pow	er class		UE power class	dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
	Rx Beam Peak	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-6	
		n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄			
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄			
	Spherical	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCS _{SSB} = 120	≥-6	
	COVERAGE Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB	≥-0	
			-101.2	- 118.8+Z ₄					

Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

Note 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S , the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

Table B.2.3-1: Conditions for inter-frequency measurements in FR1

			SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm / :	SCS _{SSB}	
raiailletei	Nix operating band groups	SCS _{SSB} = 15	SCS _{SSB} = 30	dB
		kHz	kHz	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
Conditions	NR_TDD_FR1_C	-124	-121	> 4
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.		

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

				Minimum SSB_RP Note 2, Note 3					
		ND			dBm / SC	S _{SSB}			
Parameter	Angle of arrival	arrival		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	dB	
		bands		UE pow	er class		UE power class	аь	
			1	2	3	4	1, 2, 3, 4		
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		≥-4	
	Rx Beam Peak	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB		
		n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄			
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			
	Spherical	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4	
	coverage Note 1	n260	- 115.3+Z ₁		-94.9	- 111.8+Z ₄	kHz) +3dB	2-4	
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

Editor's notes for Table B.2.3-2:

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

⁻ The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

⁻ The value of Z for power classes 1 and 4 is FFS, where Z₁, and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.4 Conditions for NR L1-RSRP reporting

B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
T di dillictoi	iait operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
Conditions	NR_TDD_FR1_C	-123	-120	≥ -3
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥-3
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1:NR	operating band groups are defined in clause	e 3.5.2.		

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

				Minimum SSB_RP Note 2, Note 3					
		ND			dBm/S	CSssb			
Parameter	Angle of arrival	arrival operating		SCS _{SSB} =	120 kHz		SCS _{SSB} = 240 kHz	-ID	
		bands		UE pow	er class		UE power class	dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
	Rx Beam Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-3	
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄			
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			
	Spherical coverage	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-3	
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB		
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.1-2:

⁻ The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1

CSI-RS Ës/lot
dB
60 kHz
5
≥ -3
,
5
6

NOTE 1: NR operating band groups are defined in clause 3.5.2.

Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2

				CSI-RS Ês/lot				
Parameter	Angle of arrival	NR operating		SCS _{CSI-RS}	SCS _{CSI-RS} = 120 kHz			
		bands		UE pow	er class		UE power class	dB
			1	2	3	4	1, 2, 3, 4	
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		
	Rx Beam	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{CSI-RS} = 60	≥-3
	Peak	n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄	kHz) +3dB	2-3
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		
	Spherical	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCScsi-Rs = 60	≥-3
	coverage Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB	2-3
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S , the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm / S	SCS _{SSB}	dB
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	uБ
	NR_FDD_FR1_A, NR_TDD_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NR	Roperating band groups are defined in clause	3.5.2.		

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

				SSB Ês/lot					
		NR			dBm / SC	Sssb			
Parameter	Angle of arrival	operating		SCS _{SSB} =	= 120 kHz		SCS _{SSB} = 240 kHz	dB	
		bands		UE pow	er class		UE power class	ав	
			1	2	3	4	1, 2, 3, 4		
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
	Rx Beam Peak	Rx Beam	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCS _{SSB} = 120	≥-4
		n260	- 123.3+Y ₁		kHz) +3dB				
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			
	Spherical coverage Note 1	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4	
		n260	- 115.3+Z₁		-94.9	- 111.8+Z ₄	kHz) +3dB	≥-4	
		n261	-114.3	-100.8	-99.2	- 116.8+Z ₄			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.6 Conditions for UE transmit timing

B.2.6.1 Conditions for SSB based UE transmit timing

This clause defines the following conditions for UE transmit timing adjustment performed based on SSBs: SSB_RP and SSB Ês/Iot and applicable for a corresponding operating band.

The conditions are defined in Table B.2.6.1-1 for FR1 SSB.

Table B.2.6.1-1: Conditions for SSB based UE transmit timing in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm / S	SCS _{SSB}	dB
		SCS _{SSB} =15 kHz	SCS _{SSB} =30 kHz	uБ
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
Conditions	NR_TDD_FR1_C	-123	-120	` 0
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -3
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1: NF	R operating band groups are defined in cla	ause 3.5.2.	<u>-</u>	·

The conditions are defined in Table B.2.6.1-2 for FR2 SSB.

Table B.2.6.1-2: Conditions for SSB based UE transmit timing in FR2

				SSB Ês/lot				
		NR			dBm/S	CS _{SSB}		
Parameter	Angle of arrival	operating		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	4D
		bands		UE pow	er class		UE power class	dB
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
	Rx Beam Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-3
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄		
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		
	Spherical coverage Note 1	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-3
		n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z₄		

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.
- NOET 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.6.1-2:

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.6.2 Void

B.3 RRM Requirements Exceptions

B.3.1 Introduction

Annex B.3 covers exceptions for side conditions based on receiver sensitivity for CA, DC, and SUL.

B.3.2 Receiver sensitivity relaxation for CA

B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this clause applies for both SC and CA operation.

B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this clause, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.4 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3A.4 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3A.4 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this clause, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.5 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in clause 7.3A.5 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.3 Receiver sensitivity relaxation for DC

B.3.3.1 Receiver sensitivity relaxation for EN-DC

Editor's note: TBD

B.3.3.2 Receiver sensitivity relaxation for NE-DC

Editor's note: TBD

B.3.4 Receiver sensitivity relaxation for SUL

B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3C.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this clause applies for both SC and SUL operation.

B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this clause, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3C.2 of TS 38.101-1 [18], when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3C.2 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3C.2 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.4.1 should not be applied.

Annex C (informative): Change history

						Change history	
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-05	RAN4#83	R4-1706324				Specification skeleton	0.0.1
2017-09						Email approved	0.1.0
2017-09	RAN4-NR AH #3	R4-1709413				Capture TPs approved in the meeting	0.2.0
2017-10	RAN4#84 -Bis	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12	RAN4#85	R4-1714546				Capture TPs approved in RAN4#85	0.4.0
2017-12	RAN#78	RP-172407				v1.0.0 submitted for plenary approval	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0032		В	CR to TS38.133	15.1.0
2018-06	RAN#80	RP-181075	0037		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87	15.2.0
2018-09	RAN#81	RP-181896	0043		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-AH-1807 and RAN4 #88	15.3.0
2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-88bis and RAN4-89	15.4.0
2019-03	RAN#83	RP-190569	0064	1	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90	15.5.0
2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91	15.6.0
2019-09	RAN#85	RP-192022	0084		F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#92 (Rel-15)	15.7.0
2019-12	RAN#86	RP-193039	0089		F	Correction to the starting point of the DRX cycle length interval	15.8.0
2019-12	RAN#86	RP-193042	0090		F	CR to 38.133 R15 Add the missing units to DRX cycle values	15.8.0
2019-12	RAN#86	RP-192997	0092	1	F	Specification of UE antenna gain range	15.8.0
2019-12	RAN#86	RP-192992	0094		F	Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak	15.8.0
2019-12	RAN#86	RP-192997	0096		F	Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0098		F	Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0100		F	Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0102		F	Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192992	0104		F	Correction to Random access test case in FR1 for PSCell in EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0106		F	CR on handover 38.133	15.8.0
2019-12	RAN#86	RP-192994	0108		F	CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0109		F	CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0110		F	CR on the BWP switch test cases SA FR1 (clause A.6.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0111		F	CR on the BWP switch test cases SA FR2 (clause A.7.5.6)	15.8.0
2019-12	RAN#86	RP-193042	0116		F	CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)	15.8.0
2019-12	RAN#86	RP-193040	0120		F	CR on handover RRM requirement (clause 6.1.1.5) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0122		F	CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0126		F	CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0128		F	CR on test cases for FR2 handover (clause A.7.3.1) (R15)	15.8.0
2019-12	RAN#86	RP-193042	0130		F	CR to 38.133 on TCI state switching (Clause 8.10) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0136		F	CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15	15.8.0
2019-12	RAN#86	RP-193042	0144		F	Editorial correction for SCell activation and deactivation delay	15.8.0
2019-12	RAN#86	RP-193040	0147		F	CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)	15.8.0
2019-12	RAN#86	RP-193041	0155		F	CR on NR MTTD and MRTD definition for R15	15.8.0
2019-12	RAN#86	RP-193039	0158		F	CR for SCell activation delay in FR2	15.8.0
2019-12	RAN#86	RP-193040	0160		F	CR for scheduling restriction due to L1-RSRP measurement	15.8.0
2019-12	RAN#86	RP-192993	0166	1	F	CR on SSB setting for new gap and SMTC setting (Clause A.3.10)	15.8.0
2019-12	RAN#86	RP-192995	0168		F	CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)	15.8.0
2019-12	RAN#86	RP-192995	0170		F	CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause A.6.7.3)	15.8.0

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Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2019-12	RAN#86	RP-192993	0184		F	CR on cell-reselection test cases for NR SA FR2 R15	15.8.0
2019-12	RAN#86	RP-192995	0186		F	endorsed CR on intra-frequency measurement and reporting for	15.8.0
						EN-DC FR2 R15	
2019-12	RAN#86	RP-192996	0188		F	endorsed CR on intra-frequency measurement and reporting for	15.8.0
						NR SA FR2 R15	
2019-12	RAN#86	RP-192996	0190		F	endorsed CR on RLM scheduling restrictions for EN-DC FR2 R15	15.8.0
2019-12	RAN#86 RAN#86	RP-192996	0192	4	F	endorsed CR on RLM scheduling restrictions for NR SA FR2 R15 Correction to PRACH configuration index in test cases	15.8.0
2019-12 2019-12	RAN#86	RP-192992 RP-193039	0200 0208	1	F	Correction to PRACH configuration index in test cases Correction on the TCI state switching (clause 8.10)	15.8.0 15.8.0
2019-12	RAN#86	RP-193039	0214	1	F	CR for 38133 editorial for clause 8.1,8.8,8.9,8.10,8.11 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0215	1	F	CR for 38133 editorial for clause 8.5 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0216	1	F	CR for 38133 editorial for clause 9.3 in Rel-15	15.8.0
2019-12	RAN#86	RP-193040	0217	1	F	CR on 38133 for removal the duplicated reference in clause 2	15.8.0
2019-12	RAN#86	RP-193040	0218	1	F	CR on 38133 for clause 11 in Rel-15	15.8.0
2019-12	RAN#86	RP-192994	0224	2	F	CR on TC of UE transmit timing (A.4.4.1.1, A.5.4.1.1, A.6.4.1.1,	15.8.0
						A.7.4.1.1) Rel-15	
2019-12	RAN#86	RP-193042	0229	1	F	Update on requirements related to inter-band EN-DC and NE-DC	15.8.0
2040.40	DANHOC	DD 400005	0000	1	_	synchronous requirements	45.0.0
2019-12 2019-12	RAN#86 RAN#86	RP-192995 RP-192992	0232 0234	1	F	Editorial corrections to measurement accuracy tests Corrections to SS-RSRQ and SS-SINR OTA tests with SA	15.8.0 15.8.0
2019-12		RP-192992 RP-192992		<u> </u>	F		
2019-12	RAN#86 RAN#86	RP-192992 RP-193042	0236 0238	1	F	Corrections to SS-RSRQ and SS-SINR OTA tests with EN-DC Editorial corrections to clause 9.2	15.8.0 15.8.0
2019-12	RAN#86	RP-193042 RP-192992	0238		F	Corrections to clause 9.2 Corrections to band applicability of measurement accuracy tests	15.8.0
2019-12	RAN#86	RP-192992	0241	1	F	Introduction of bandwidth limited OCNG for OTA testing	15.8.0
2019-12	RAN#86	RP-192990	0243	1	F	Corrections to test cases for SA FR2 inter-frequency measurement	15.8.0
2013-12	IXAIN#00	101-192992	0247	'	'	(clause A.7.6.2)	13.0.0
2019-12	RAN#86	RP-193041	0249		F	CR to 38.133 NR reporting criteria	15.8.0
2019-12	RAN#86	RP-192993	0263	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
						EN-DC in FR1	
2019-12	RAN#86	RP-192993	0265	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
						SA in FR1	
2019-12	RAN#86	RP-192993	0267	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
2040.40	DANHOC	DD 400000	0000	4	_	EN-DC in FR2	45.0.0
2019-12	RAN#86	RP-192993	0269	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
2019-12	RAN#86	RP-193040	0275	1	F	SA in FR2 CR on delay uncertainty of RRC Release with redirection	15.8.0
2013-12	117.1147700	100040	0273	'	'	requirements in TS 38.133	10.0.0
2019-12	RAN#86	RP-193040	0277	1	F	CR on known condition of PSCell addition requirement in NE-DC	15.8.0
2019-12	RAN#86	RP-193041	0279	1	F	CR on known condition of PSCell addition requirement in NR DC	15.8.0
2019-12	RAN#86	RP-193041	0281	1	F	CR on RRC Re-establishment requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0283	2	F	CR on scope of interruption requirements of EN-DC in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0285	1	F	CR on scope of MTTD requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-192994	0287	1	F	CR on SSB-based RLM test case for EN-DC FR1	15.8.0
2019-12	RAN#86	RP-192994	0289	1	F	CR on SSB-based RLM test case for NR SA FR1	15.8.0
2019-12	RAN#86	RP-193042	0291	1	F	Editorial CR on clause 8.2	15.8.0
2019-12	RAN#86	RP-193041	0295	1	F	CR on NR inter-frequency identification	15.8.0
2019-12	RAN#86	RP-193041	0297	1	F	CR on NR intra-frequency measurements	15.8.0
2019-12	RAN#86	RP-193039	0311	1	F	Correction on CSSF within measurement gap (clause 9.1.5.2)	15.8.0
2019-12	RAN#86	RP-193041	0313		F	CR on RLM scheduling restriction (clause 8.1.7)	15.8.0
2019-12	RAN#86	RP-193041	0315	1	F	CR on SCell activation requirements (clause 8.3.2)	15.8.0
2019-12	RAN#86	RP-193042	0317	ļ	F	CR to add QCL definition (clause 3.6)	15.8.0
2019-12	RAN#86	RP-192993	0319		F	CR on power offset in TRS RMC (A.3.17)	15.8.0
2019-12	RAN#86	RP-192995	0321	ļ	F	CR to introduce new PDCCH RMC (A.3.1.3.2)	15.8.0
2019-12	RAN#86	RP-192997	0323		F	Maintenance CR for measurement accuracy (clause 10.1)	15.8.0
2019-12	RAN#86	RP-192996	0325		F	FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15.8.0
2010 12	D / N #06	DD 102006	0327	1	F	A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15 0 0
2019-12	RAN#86	RP-192996	0327	'	「	A.4.5.1)	15.8.0
2019-12	RAN#86	RP-192996	0329		F	FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0
2019-12	RAN#86	RP-192996	0331	1	F	FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0
2019-12	RAN#86	RP-192997	0333	1	F	L1-RSRP delay test FR1 EN-DC (clause A.4.6.3)	15.8.0
2019-12	RAN#86	RP-192997	0335	<u> </u>	F	L1-RSRP delay test FR2 EN-DC (clause A.5.6.3)	15.8.0
2019-12	RAN#86	RP-192997	0337	1	F	L1-RSRP delay test FR1 SA (clause A.6.6.4)	15.8.0
2019-12	RAN#86	RP-192997	0339	<u> </u>	F	L1-RSRP delay test FR2 SA (clause A.7.6.3)	15.8.0
2019-12	RAN#86	RP-192996	0343		F	L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4)	15.8.0
2019-12	RAN#86	RP-192996	0345		F	L1-RSRP accuracy test FR2 SA (clause A.7.7.4)	15.8.0
2019-12	RAN#86	RP-193039	0357		F	CR 38.133 (8.3.2) Amendment of requirements depending on	15.8.0
						T_SMTC_Max	
2019-12	RAN#86	RP-193039	0359		F	CR 38.133 (8.3.3) Correction of SCell deactivation delay	15.8.0
2019-12	RAN#86	RP-192992	0361		F	CR 38.133 (A.7.5.7) TCs for PSCell addition and release delay	15.8.0

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2019-12	RAN#86	RP-192995	0365		F	CR to TS 38.133: New common clause with OTA related	15.8.0
2019-12	RAN#86	RP-192995	0367		F	definitions for FR2 testing (Rel-15) CR to TS 38.133: Configuration of NR FR1 cell in NR FR1-FR2	15.8.0
2019-12	RAN#86	RP-192995	0369		F	tests (Rel-15) CR to TS 38.133: Clarificatins to Antenna Configurations for FR2	15.8.0
2019-12	RAN#86	RP-192995	0371		F	(Rel-15) CR to TS 38.133: Corrections to CORESET RMCs (Rel-15)	15.8.0
2019-12	RAN#86	RP-192995	0373		F	CR to TS 38.133: Corrections to CORESET KINGS (Ref-15)	15.8.0
2019-12	RAN#86	RP-193042	0375	1	F	Editorial updates (clause 9.4)	15.8.0
2019-12	RAN#86	RP-193039	0377	1	F	Correction in interruption requirements (clause 8.2)	15.8.0
2019-12	RAN#86	RP-193042	0379	1	F	Editorial updates (Annex B)	15.8.0
2019-12	RAN#86	RP-193040	0381		F	CR on 38133 for MRTD and MTTD in intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-192992	0384	1	F	CR for MAC-CE based TCI State switch for ENDC (Clause A.5.5.8)	15.8.0
2019-12	RAN#86	RP-192993	0385	1	В	CR for MAC-CE based TCl State switch for NR SA (Clause A.7.5.7)	15.8.0
2019-12	RAN#86	RP-192993	0386	1	В	CR for RRC based TCI State switch for NR SA (Clause A.7.5.7)	15.8.0
2019-12	RAN#86	RP-192993	0387	1	F	CR for RRC based TCI State switch for EN-DC (Clause A.5.5.8)	15.8.0
2019-12	RAN#86	RP-192992	0388	1	F	CR for FR1 handover test cases (Clause A.6.3.1.1, A.6.3.1.2, A.6.3.1.3)	15.8.0
2019-12	RAN#86	RP-193041	0389	1	F	CR on MTTD for intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0397		F	CR on corrections on NR intra frequency measurement reporting requirements (Clause 9.2.4)	15.8.0
2020-03	RAN#87	RP-200400	0404	1	F	[CR] handover requirements 38.133 R15	15.9.0
2020-03	RAN#87	RP-200400	0411	1	F	[CR] SCell activation delay 38.133 R15	15.9.0
2020-03	RAN#87	RP-200400	0416		F	Corrections to RRM Test case A.7.1.1.2	15.9.0
2020-03	RAN#87	RP-200400	0418		F	Correction to Active UL BWP for SA intra-frequency event triggered reporting with per-UE gaps	15.9.0
2020-03	RAN#87	RP-200400	0420		F	Correction to FR1-E-UTRA Inter-RAT cell re-selection test cases	15.9.0
2020-03	RAN#87	RP-200400	0422		F	Removal of Time offset between PCell and PSCell in SA RRM Test cases	15.9.0
2020-03	RAN#87	RP-200400	0424		F	Correction to SRS periodicity and Offset for UL transit timing with DRx config	15.9.0
2020-03	RAN#87	RP-200400	0426		F	Update of Test Requirements, FR2 Intra-frequency SS-RSRP accuracy Test cases	15.9.0
2020-03	RAN#87	RP-200400	0428		F	Update of Test requirements, FR2 Inter-frequency SS-RSRP accuracy Test cases	15.9.0
2020-03	RAN#87	RP-200484	0438	2	F	CR on test cases for SA FR2 inter-frequency measurement R15 (section A.7.6.2)	15.9.0
2020-03	RAN#87	RP-200400	0444	1	F	Editorial corrections for 38.133 Perf Part R15	15.9.0
2020-03	RAN#87	RP-200400	0446		F	Editorial corrections for 38.133 Core Part R15	15.9.0
2020-03	RAN#87	RP-200400	0453		F	Editorial correction for active TCI state switching delay	15.9.0
2020-03 2020-03	RAN#87 RAN#87	RP-200400 RP-200400	0461 0463	1	F	CR for reference correction on L1-RSRP measurement period	15.9.0 15.9.0
2020-03	RAN#87	RP-200400	0465		F	(section 9.5.3) CR for measurement restriction in FR2 across CCs (section	15.9.0
					<u> </u>	8.1.2.3, 8.1.3.3, 8.5.2.3, 8.5.3.3, 8.5.5.3, 8.5.6.3, 9.5.5.1, 9.5.5.2)	
2020-03	RAN#87	RP-200400	0467		F	CR for SSB based candidate beam detection (section 8.5.5.2)	15.9.0
2020-03	RAN#87	RP-200400 RP-200400	0487		F	CR to TS 38.133: Corrections to FR1-FR2 event triggered test cases Annex A.5 (Rel-15) CR to TS 38.133: Corrections to FR1-FR2 event triggered test	15.9.0 15.9.0
					F	cases Annex A.7 (Rel-15) CR to TS 38.133: Clarifications to AoA setup and AoA cell	
2020-03	RAN#87	RP-200400	0491			assignement Annex A.5 (Rel-15)	15.9.0
2020-03 2020-03	RAN#87 RAN#87	RP-200400 RP-200400	0493 0495		F	CR to TS 38.133: Clarifications to AoA setup Annex A.8 (Rel-15) CR to TS 38.133: Addition of TC A.4.7.2.2 (Rel-15)	15.9.0 15.9.0
2020-03	RAN#87	RP-200400	0493		F	Editorial correction of EN-DC FR1 L1-RSRP measurement for beam reporting	15.9.0
2020-03	RAN#87	RP-200400	0501		F	Editorial correction of NR SA FR1 L1-RSRP measurement for beam reporting	15.9.0
2020-03	RAN#87	RP-200400	0508		F	CR on removing one-shot timing adjustment requirements	15.9.0
2020-03	RAN#87	RP-200400	0515	1	F	Correction to BWP switching delay	15.9.0
2020-03	RAN#87	RP-200400	0517	1	F	Correction to inter-RAT measurement on LTE serving carrrier	15.9.0
2020-03	RAN#87	RP-200400	0519	1	F	Correction to configurations for TRS	15.9.0
2020-03	RAN#87	RP-200400	0521		F	NOTE The CR is not implemented because the changes in this CR were already implemented in the latest version of the specification.	15.9.0

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2020-03	RAN#87	RP-200400	0523		F	Correction to interruption TCs	15.9.0				
						NOTE The CR is not implemented because some parts of changes in the CR were already implemented in the latest version of the specification.					
2020-03	RAN#87	RP-200400	0527		F	Correction to RF channels configuration	15.9.0				
2020-03	RAN#87	RP-200400	0529		F	Correction to RRC release with redirection TCs	15.9.0				
2020-03	RAN#87	RP-200400	0531		F	Correction to UL reconfiguration delay TCs	15.9.0				
2020-03	RAN#87	RP-200400	0537		F	CR on SSB RLM test cases EN-DC R15	15.9.0				
2020-03	RAN#87	RP-200400	0539		F	CR on SSB RLM test cases SA R15	15.9.0				
2020-03	RAN#87	RP-200400	0541		F	CR on cell reselection test cases for FR2 SA R15	15.9.0				
2020-03	RAN#87	RP-200400	0543		F	OCNG pattern for TDM-ed SSB R15	15.9.0				
2020-03	RAN#87	RP-200400	0563		F	NR editorial correction	15.9.0				
2020-03	RAN#87	RP-200400	0579	1	F	CR 38.133 (8.11) Corrections to PSCell change delay requirements	15.9.0				
2020-03	RAN#87	RP-200400	0586		F	PRACH configurations in FR1 SSB based RLM tests	15.9.0				
2020-03	RAN#87	RP-200400	0588		F	PRACH configurations in FR1 SSB based BFR tests	15.9.0				

History

	Document history								
V15.2.0	July 2018	Publication							
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V15.5.0	July 2019	Publication							
V15.6.0	July 2019	Publication							
V15.7.0	October 2019	Publication							
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