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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.

Standalone".

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

[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".

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.

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

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

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

FR1: Frequency range 1 as defined in TS 38.104 [13, Section 5.1].

FR2: Frequency range 2 as defined in TS 38.104 [13, Section 5.1].

gNB: as defined in in TS 38.300 [10].

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

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

NSA operation mode: EN-DC operation mode, where the UE is configured at least with PSCell and E-UTRA PCell.

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

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.

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].

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

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

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].

BWP Bandwidth Part
CA Carrier Aggregation
CC Component Carrier
CP Cyclic Prefix

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

DL Downlink

DMRS Demodulation Reference Signal DRX Discontinuous Reception

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

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

MGRP Measurement Gap Repetition Period

MIB Master Information Block

NR New Radio

NSA Non-Standalone operation mode

OFDM Orthogonal Frequency Division Multiplexing
OFDMA Orthogonal Frequency Division Multiple Access

PBCH Physical Broadcast Channel

PCell Primary Cell

PLMN Public Land Mobile Network

PRACH Physical RACH PSCell Primary SCell

PSS Primary Synchronization Signal
PUCCH Physical Uplink Control Channel
PUSCH Physical Uplink Shared Channel
RACH Random Access Channel

RAT Radio Access Technology
RLM Radio Link Monitoring
RLM-RS Reference Signal for RLM
RRC Radio Resource Control
RRM Radio Resource Management
RSSI Received Signal Strength Indicator

SA Standalone operation mode

SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SCS_{SSB} SSB subcarrier spacing

SDL Supplementary Downlink
SFN System Frame Number
SI System Information
SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SRS Sounding Reference Signal

SSSS-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

SUL Supplementary Uplink
TA Timing Advance
TAG Timing Advance Group
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 section 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
	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
В	NR_FDD_FR1_B	n66, n74 ³	NR_TDD_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77¹, n78, n79
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77²
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20, n71	NR_TDD_FR1_G	-
Н	NR_FDD_FR1_H	n25	NR_TDD_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

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 notation	Operating bands
A 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	
E	NR_TDD_FR2_E	
F	NR_TDD_FR2_F	n260 ⁴
G	NR_TDD_FR2_G	n257 ² , n258 ² , n260 ¹ , n261 ²
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	
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	n257³, n258³, n261³
U	NR_TDD_FR2_U	
V	NR_TDD_FR2_V	
W	NR_TDD_FR2_W	
X	NR_TDD_FR2_X	
Y	NR_TDD_FR2_Y	n260 ³

NOTE 1: UE power class 1. NOTE 2: UE power class 2.

NOTE 3: 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 PCell, NR PSCell and NR SCell,
- E-UTRA cells are referred to as 'E-UTRA cell', 'E-UTRA PCell' 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'.

For UE configured with supplementary UL, the requirements in section 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 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 EN-DC in the MCG for both UL and DL is specified in TS 36.133 [15].

3.6.3 Applicability for SSB Rx beam in intra-band FR2

For the requirements in RRC connected state specified in this version of the specification, UE shall assume that the SSBs from the serving cells should have the same downlink spatial domain transmission filter in the same band in FR2. If the SSBs don't have same downlink spatial domain transmission filter the UE is not supposed to satisfy any requirements for SCell.

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 Section 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, Section 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, Section 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.
- Depending on UE capability, 7 FDD E-UTRA inter-RAT carriers, and
- Depending on UE capability, 7 TDD E-UTRA inter-RAT carriers, and

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 [1] for the serving cell at least once every M1 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 4.2.2.1-1 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 4.2.2.1-1: N_{serv}

DRX cycle length [s]	Scaling Factor (N1)		N _{serv} [number of DRX cycles]	
	FR1	FR2 ^{Note1}		
0.32		[8]	M1*N1*[4]	
0.64	4	[5]	M1*N1*[4]	
1.28	1	[4]	N1*[2]	
2.56		[TBD]	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 has at least [3]dB in FR1 or [TBD]dB in FR2 better ranked or
- when *rangeToBestCell* is configured, the cell which has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among the cells whose cell-ranking criterion R value as specified in TS 38.304 [1, Section 5.2.4.6] is within *rangeToBestCell* of the R value of the best cell where the best cell has at least [TBD] in FR1 or [TBD]dB in FR2 better ranked, and if there are multiple such cells the UE shall perform cell reselection to the highest ranked cell 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.

DRX cycle	Scaling Factor (N1)		T _{detect,NR_Intra} [S]	Tmeasure,NR_Intra [S]	T _{evaluate,NR_Intra} [s] (number of DRX cycles)
length [s]	gth [s] FR1 FR2 ^{Note1} (number of DRX cycles)			(number of DRX cycles)	
0.32		[8]	11.52 x N1 x M2 (36 x	1.28 x N1 x M2 (4 x N1	5.12 x N1 x M2 (16 x
			N1 x M2)	x M2)	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		[TBD]	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)

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

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 subclause.

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 [TBD]dB in FR2 for reselections based on ranking or [6]dB in FR1 or [TBD] dB in FR2 for SS-RSRP reselections based on absolute priorities or [4]dB in FR1 and [TBD] 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 T_{measure,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 section 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 has at least [5]dB in FR1 or [TBD]dB in FR2 better ranked or
- when *rangeToBestCell* is configured, the cell which has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among the cells whose cell-ranking criterion R value as specified in TS 38.304 [1, Section 5.2.4.6] is within *rangeToBestCell* of the R value of the best cell where the best cell has at least [TBD] in FR1 or [TBD]dB in FR2 better ranked, and if there are multiple such cells the UE shall perform cell reselection to the highest ranked cell among them or
- [6]dB in FR1 or [TBD]dB in FR2 for SS-RSRP reselections based on absolute priorities or
- [4]dB in FR1 or [TBD] 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.

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,
- SMTC occasions configured for the inter-frequency carrier occur up to TBD ms before the start or up to TBD 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 TBD ms before the start or up to TBD ms after the end of the paging occasion [1].

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

DRX cycle	Scaling F	actor (N1)	T _{detect,NR_Inter} [s] - (number of DRX cycles)	Tmeasure,NR_Inter [S]	Tevaluate,NR_Inter [S] (number of DRX cycles)
length [s]	FR1	FR2 ^{Note1}		(number of DRX cycles)	
0.32		[8]	11.52 x N1 x 1.5 x (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		[TBD]	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					
le	ength.				

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 $Srxlev \leq S_{nonIntraSearchP}$ 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 section 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 section. 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 $Srxlev \le S_{nonIntraSearchP}$ or $Squal \le S_{nonIntraSearchO}$.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{\text{measure}, \text{EUTRAN}}$. 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 section 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 [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 $T_{SI\text{-}EUTRA} + 55$ 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.

 $T_{\text{SI-EUTRA}}$ 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 RRC_INACTIVE Mobility Control

Editor's note: intended to capture requirements which applies for the transition between INACTIVE and IDLE state. This section might be removed if unnecessary.

6 RRC_CONNECTED state mobility

6.1 Handover

Editor's note: if handover requirements are differentiated by with beamforming and without beamforming, then two sets of requirements (with/without beamforming) could be specified in this section.

6.1.1 NR Handover

6.1.1.1 Introduction

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

Procedure delays for all procedures that can command a handover are specified in TS 38.331 [2].

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} seconds from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the maximum RRC procedure delay to be defined in clause12 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 Tinterrupt

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

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 -TBD dB, then $T_{search}=T_{rs}+2$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geq -TBD dB, then $T_{search}=[3*T_{rs}+2]$ 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_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to x*10+10 ms. x is defined in the table 6.3.3.2-2 of TS 38.211 [6].

 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 section is applied with Trs = [5] ms assuming the SSB transmission periodicity is 5 ms. There is no requirements if the SSB transmission periodicity is not 5 ms.

NOTE 1: 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 cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.1 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

Procedure delays for all procedures that can command a handover are specified in TS 38.331 [2].

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} seconds from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the maximum RRC procedure delay to be 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

$$T_{interrupt} = T_{search} + T_{IU} + 40 + T_{\Delta} ms$$

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 -TBD dB, then $T_{search}=[3*T_{rs}+2]$ 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_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to x*10+10 ms. x is defined in the table 6.3.3.2-2 of [6].

 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 section is applied with $T_{rs} = [5]$ ms assuming the SSB transmission periodicity is 5 ms. 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.

NOTE 1: 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 cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.1 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

Procedure delays for all procedures that can command a handover are specified in TS 38.331 [2].

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 $D_{handover}$ seconds from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the maximum RRC procedure delay to be 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}

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

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 an intra-frequency cell and the target cell Es/Iot \geq -TBD dB, then $T_{search} = [8*T_{rs} + 2]$ ms. If the target cell is an inter-frequency cell and the target cell Es/Iot \geq -TBD dB, then $T_{search} = [8*3*T_{rs} + 2]$ 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_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = [1]^* T_{rs}$.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to x*10+10 ms. x is defined in the table 6.3.3.2-2 of [6].

 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 section is applied with $T_{rs} = [5]$ ms assuming the SSB transmission periodicity is 5 ms. There is no requirements if the SSB transmission periodicity is not 5 ms. 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.

NOTE 1: The actual value of T_{IU} shall depend upon the PRACH configuration used in the target cell.

NOTE 2: Void

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

Procedure delays for all procedures that can command a handover are specified in TS 38.331 [2].

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 $D_{handover}$ seconds from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the maximum RRC procedure delay to be 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 intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than T_{interrupt}

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

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 an intra-frequency cell and the target cell Es/Iot \geq -TBD dB, then $T_{search} = [8*T_{rs} + 2]$ ms. If the target cell is

an inter-frequency cell and the target cell Es/Iot \geq -TBD dB,, then $T_{search} = [8*3*T_{rs} + 2]$ 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_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = [1] * T_{rs}$.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to x*10+10 ms. x is defined in the table 6.3.3.2-2 of [6].

 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 section is applied with T_{rs} ms assuming the SSB transmission periodicity is 5 ms. There is no requirements if the SSB transmission periodicity is not 5 ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of s_{mtc2} prior to the handover command, T_{rs} follows s_{mtc1} or s_{mtc2} according to the physical cell ID of the target cell.

NOTE 1: The actual value of T_{IU} shall depend upon the PRACH configuration used in the target cell.

NOTE 2: Void

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 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].

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 $D_{handover}$ seconds from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC procedure delay} + T_{interruption}$$

Where:

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

 $T_{interruption}$: 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 $T_{RRC_procedure_delay}$. $T_{interruption}$ is defined in clause 6.1.1.3.

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

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

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 mode 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_{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:

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

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

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

- SS-RSRP related side conditions given in Section 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively,
- SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR Band.

 $T_{identify_intra_NR}$: 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* prior to the handover command, 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.

 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 PCell.

 T_{PRACH} = It is the delay caused due to the random access procedure when sending random access to the target NR cell. The delay depends on the PRACH configuration defined in Table 6.3.3.2-2 [6] or Table 6.3.3.2-3 [6] for FR1 and in Table 6.3.3.2-4 [6] for FR2.

 N_{freq} : It is the total number of NR frequencies to be monitored for RRC re-establishment; $N_{\text{freq}} = 2$ if the target interfrequency PCell 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	3420 ^{Note1}
Note 1: T _{SMTC} =20 ms when serving cell SSB Ês/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	Known NR cell	Unknown NR cell
	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: T _{SMTC,i} = 20 ms when serving cell SSB Ês/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].

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 a NACK on msg3

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3.

6.2.2.2.1.5 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 assocated 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 *RRCConnectionRelease* 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 intra-frequency target NR cell shall be considered detectable when for each relevant SSB:

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

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

- SS-RSRP related side conditions given in Section 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively,
- SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR 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].

 $T_{identify-NR}$: It is the time to identify the target NR cell and depend 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. $T_{SI-NR}=0$ provided the UE is provided with the SI (including MIB and all relevant SIBs) of the target NR cell before the RRC connection is released by the old NR cell.

 T_{RACH} : It is the delay caused due to the random access procedure when sending random access to the target NR cell. This delay depends on the PRACH configuration defined in Table 6.3.3.2-2 [6] or Table 6.3.3.2-3 [6] for FR1 and in Table 6.3.3.2-4 [6] for FR2.

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 SMTC period)	
FR2		MAX (880 ms, 8x[11] x SMTC period)	
Note:	: If the UE has been provided with higher layer in TS 38.331 [2] signaling of smtc2 prior to the		
	redirection command, SMTC 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 $T_{connection_release_redirect_E-UTRA}$.

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 when for each relevant SSB:

- RSRP related conditions in the accuracy requirements in Section 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2 and Annex B.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in Section 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2 and Annex B.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in Section 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2 and Annex B.3 of TS 36.133 [15].

 $T_{RRC_procedure_delay}$: 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. $T_{SI\text{-}E\text{-}UTRA} = 0$ provided the UE is provided with the SI (including MIB and all relevant SIBs) of the target E-UTRA cell before the RRC connection is released by the old NR cell.

 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 connected gNB. 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. The reference cell is PSCell in case of EN-DC. The reference cell is PCell in case of NR standalone. If the UE is configured with a pTAG containing the PCell, UE shall use the PCell as the reference cell for deriving the UE transmit timing for cells in the pTAG. If the UE is configured with a psTAG containing the PSCell, UE shall use the PSCell as the reference cell for deriving the UE transmit timing for cells in the psTAG.UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate 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.

 $(N_{\rm TA} + N_{\rm TA~offset}) \times T_{\rm c}$ (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.

Frequency SCS of uplink SCS of SSB Te Range signals (KHz) signals s(KHz) 12*64*Tc 15 30 15 10*64*Tc 10*64*Tc 60 1 8*64*Tc 15 8*64*T_c 30 30 7*64*Tc 60 3.5*64*T_c 60 120 3.5*64*T_c 120 2 3*64*Tc 60 240 3*64*Tc 120 T_c is the basic timing unit defined in TS 38.211 [6]

Table 7.1.2-1: Te Timing Error Limit

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

Frequency range and band of cell used for uplink	N _{TA offset} (Unit: Tc)
transmission	TA Offset C
FR1 FDD band without LTE-NR coexistence case or	25600 (Note 1)
FR1 TDD band without LTE-NR coexistence case	
FR1 FDD band with LTE-NR coexistence case	0 (Note 1)
FR1 TDD band with LTE-NR coexistence case	39936 (Note 1)
FR2	13792
Note 1: The UE identifies $N_{ m TA~offset}$ based on the infor	mation n-
Timing Advance Offers according to [0] If LIF is	ما المام

ote 1: The UE identifies $N_{\mathrm{TA~offset}}$ based on the information n-TimingAdvanceOffset according to [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of $N_{\mathrm{TA~offset}}$ 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 section 4.2 in [3] and the value 39936 of $N_{\mathrm{TA~offset}}$ 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.

When the transmission timing error between the UE and the reference timing exceeds $\pm T_e$, the UE is required to adjust its timing to within $\pm T_e$. The reference timing shall be $(N_{\rm TA} + N_{\rm TA~offset}) \times T_c$ 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 200ms.

where the maximum autonomous time adjustment step T_q and the aggregate adjustment rate T_p are specified in Table 7.1.2-3.

Table 7.1.2-3: T_q Maximum Autonomous Time Adjustment Step and T_p Minimum Aggregate Adjustment rate

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

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 [TBD], 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 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 for a timing advance command received in time slot n, and the value of k is defined in section 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

Sub Carrier Spacing, SCS 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 $3 \mu s$.

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 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 slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

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

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-2. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.5.2-2 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
NOTE 1: Void		

Editor Note: It is FFS the necessity of inter-band EN-DC synchronous requirement for MTTD.

7.5.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only collocated 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 [16]. No requirement on maximum uplink transmission timing difference is applicable for synchronous E-UTRA FDD-NR FDD and E-UTRA TDD-NR TDD intra-band EN-DC.

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 different TAGsas 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 mode. or
- configured with more than one sTAG for inter-band NR carrier aggregation in NSA mode.

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

Frequency Range	Maximum transmission timing difference (µs)
FR1	34.6
FR2	8.5
Between FR1 and FR2	26.1

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 E-UTRA PCell and slot timing boundary of PSCell to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative receive timing difference among 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 E-UTRA PCell and slot timing of signal from PSCell 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 in E-UTRA PCell (kHz)	DL Sub-carrier spacing in PSCell (kHz) (Note 1)	Maximum receive timing difference (μs)
15	15	500
15	30	250
15	60	125
15	120 ^{Note2}	62.5

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

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

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from E-UTRA PCell and slot timing of signal from PSCell at the UE receiver as shown in Table 7.6.2-2. 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 7.6.2-2: Maximum receive timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	DL Sub-carrier spacing in PSCell (kHz) (Note1)	Maximum receive timing difference (µs)	
15	15		
15	30		
15	60	33	
15	120		
NOTE 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}.			
NOTE 2: Void			

Editor Note: It is FFS the necessity of inter-band EN-DC synchronous requirement for MRTD.

Table 7.6.2-3 Void

7.6.3 Minimum Requirements for intra-band EN-DC

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

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from E-UTRA PCell and slot timing of signal from PSCell as shown in Table 7.6.2-1 for E-UTRA FDD-NR FDD intraband EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation[16].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from E-UTRA PCell and slot timing of signal from PSCell as shown in Table 7.6.3-1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC.

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

Sub-carrier spacing in E-UTRA PCell (kHz)	DL Sub-carrier spacing in PSCell (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 collocated 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

Frequency Range	Maximum receive timing difference (µs)	
FR1	3	
FR2	3	

For inter-band 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 7.6.4-2 below.

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

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

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 SFN of all cells on the same frequency carrier are the same.

7.8 Maximum Allowed UE Transition Times for TDD Intra-band Carrier Aggregation

7.8.1 Requirements

A UE is not expected to transmit in the uplink to a cell earlier than after the end of the last received downlink symbol from the any cell in the same TDD band where is given by Table 4.3.2-3 in TS 38.211 [6].

A UE is not expected to receive in the downlink from a cell earlier than after the end of the last transmitted uplink symbol toward any cell in the same TDD band where is given by Table 4.3.2-3 in TS 38.211 [6].

8 Signalling characteristics

8.1 Radio Link Monitoring

8.1.1 Introduction

The UE shall monitor the downlink link quality based on the reference signal in the configured RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in [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 significantly more reliably received 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 RLM-IS-OOS-thresholdConfig from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 8.1.1-1 as default. All requirements in Section 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 X_{RLM-RS} RLM-RS resources of the same or different types in each corresponding carrier frequency range, where X_{RLM-RS} is specified in Table 8.1.1-2, and meet the requirements as specified in section 8.1.

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

Maximum number of RLM-RS resources, X _{RLM-RS}	Carrier frequency range of PCell/PSCell	
2	FR1, ≤ 3 GHz	
4	FR1, > 3 GHz	
8	FR2	

If different SCS is used for CSI-RS based RLM-RS and SSB, then CSI-RS based RLM-RS and SSB shall be TDMed. If same SCS is used for CSI-RS based RLM-RS and SSB, then CSI-RS based RLM-RS and SSB can be FDMed or TDMed.

8.1.2 Requirements for SSB based radio link monitoring

8.1.2.1 Introduction

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

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

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 (MHz)	TBD	
Sub-carrier spacing (kHz)	TBD	
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

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 SSS RE energy	0dB	
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	0dB	
Bandwidth (MHz)	TBD	
Sub-carrier spacing (kHz)	TBD	
DMRS precoder granularity	REG bundle size	
REG bundle size	6	
CP length	Normal	
Mapping from REG to CCE	Distributed	

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

- N=1.

if the SSB configured for RLM is QCL-Type D and TDMed to CSI-RS resources configured for L1-RSRP reporting, and the QCL association is known to UE;

- N=8, otherwise.

For FR1,

- P=1/(1 T_{SSB}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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,

- $P=1/(1-T_{SSB}/T_{SMTCperiod})$, when RLM-RS is not overlapped with measurement gap and RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is 3, when RLM-RS is not overlapped with measurement gap and RLM-RS is fully overlapped with SMTC period (T_{SSB} = T_{SMTCperiod}).
- P is $1/(1-T_{SSB}/MGRP-T_{SSB}/T_{SMTCperiod})$, when RLM-RS is partially overlapped with measurement gap and RLM-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
 - $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $1/(1-T_{SSB}/MGRP)*3$, when RLM-RS is partially overlapped with measurement gap and RLM-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 $T_{SSB} = 0.5*T_{SMTCperiod}$
- P is $1/\{1-T_{SSB}/min(T_{SMTCperiod},MGRP)\}$, when RLM-RS is partially overlapped with measurement gap and RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- P is 1/(1-T_{SSB} /MGRP)*3, when RLM-RS is partially overlapped with measurement gap and RLM-RS is fully overlapped with SMTC occasion (T_{SSB} = 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*.

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

Table 8.1.2.2-1: Evaluation period T_{Evaluate_out} and T_{Evaluate_in} for FR1

Configuration	T _{Evaluate_out} (ms)	T _{Evaluate_in} (ms)	
no DRX	max(200,ceil(10*P)*T _{SSB})	max(100,ceil(5*P)*T _{SSB})	
DRX cycle≤320	max(200,ceil(15*P)*max(T _{DRX} ,T _{SSB}))	max(100,ceil(7.5*P)*max(T _{DRX} ,T _{SSB}))	
DRX cycle>320 ceil(10*P)*T _{DRX} ceil(5*P)*T _{DRX}			
NOTE: T _{SSB} is the periodicity of SSB configured for RLM. T _{DRX} is the DRX cycle length.			

Table 8.1.2.2-2: Evaluation period T_{Evaluate_out} and T_{Evaluate_in} for FR2

Configuration	T _{Evaluate_out} (ms)	T _{Evaluate_in} (ms)		
no DRX	max(200,ceil(10*P*N)*T _{SSB})	max(100,ceil(5*P*N)*T _{SSB})		
DRX cycle≤320	max(200,ceil(15*P*N)*max(T _{DRX} ,T _{SSB}))	max(100,ceil(7.5*P*N)*max(T _{DRX} ,T _{SSB}))		
DRX cycle>320 ceil(10*P*N)*T _{DRX} ceil(5*P*N)*T _{DRX}				
NOTE: TssB is the periodicity of SSB configured for RLM. TdRX is the DRX cycle length.				

8.1.3 Requirements for CSI-RS based radio link monitoring

8.1.3.1 Introduction

The requirements in this section apply for each CSI-RS based RLM-RS resource configured for PCell or PSCell, provided that the CSI-RS configured for RLM are actually transmitted within UE active DL BWP during the entire evaluation period specified in section 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 QCL-ed with any CORESET configured in the UE active BWP.

Editor's Note: FFS if the configured TCI state or the active TCI state of the CORESET should be considered.

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

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 (MHz)	TBD	
Sub-carrier spacing (kHz)	TBD	
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 CSI-RS 0dB RE energy Ratio of hypothetical PDCCH DMRS energy to average [0]dB CSI-RS RE energy Bandwidth (MHz) TBD Sub-carrier spacing (kHz) TBD 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

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, where
 - N=1,

if the CSI-RS resource configured for RLM is QCL-Type D and TDMed to CSI-RS resources configured for L1-RSRP reporting or SSBs configured for L1-RSRP reporting, all CSI-RS resources configured for RLM are mutually TDMed, and the QCL association is known to UE;

- N=8, otherwise.

For FR1,

- $P=1/(1-T_{CSI-RS}/MGRP)$, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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 RLM-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=1/(1-T_{CSI-RS}/MGRP)$, when RLM-RS is partially overlapped with measurement gap and RLM-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P=1/(1-T_{CSI-RS}/T_{SMTCperiod})$, when RLM-RS is not overlapped with measurement gap and RLM-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- P is 3, when RLM-RS is not overlapped with measurement gap and RLM-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).

- P is 1/(1- T_{CSI-RS} /MGRP T_{CSI-RS} /T_{SMTCperiod}), when RLM-RS is partially overlapped with measurement gap and RLM-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 is $1/(1-T_{CSI-RS}/MGRP)^*$ 3, when RLM-RS is partially overlapped with measurement gap and RLM-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 is 1/{1-T_{CSI-RS} /min (T_{SMTCperiod} ,MGRP)}, when RLM-RS is partially overlapped with measurement gap and RLM-RS is partially overlapped with SMTC occasion (T_{CSI-RS} < T_{SMTCperiod}) and SMTC occasion is partially or fully overlapped with measurement gap
- P is 1/(1- T_{CSI-RS} /MGRP)* 3, when RLM-RS is partially overlapped with measurement gap and RLM-RS 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 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, SMTC occasion and measurement gap configurations does not meet pervious 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 Density =3.

Table 8.1.3.2-1: Evaluation period T_{Evaluate_out} and T_{Evaluate_in} for FR1

Table 8.1.3.2-2: Evaluation period T_{Evaluate out} and T_{Evaluate in} for FR2

T_{CSI-RS} is the periodicity of CSI-RS resource configured for RLM. T_{DRX} is the DRX cycle length.

	Configuration	T _{Evaluate_out} (ms)	T _{Evaluate_in} (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×Mout×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:	Tcsi-Rs is the periodicity of CSI-R	S resource configured for RLM. TDRX is	the DRX cycle length.

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 themonitored cell.

When the UE transitions from a first configuration of RLM-RS resources to a second configuration of RLM-RS resources that is different from the first configuration, for each RLM-RS 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-RS resource present in the second configuration. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of themonitored 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 section 8.1.2 if the RLM-RS resource is SSB, or T_{CSI-RS} specified in section 8.1.3 if the RLM-RS resource is CSI-RS.

In case DRX is used, $T_{Indication_interval}$ is max(10ms, 1.5*DRX_cycle_length, 1.5* $T_{RLM-RS,M}$) 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 and on frequency range FR2, 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 UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UE 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 receive PDCCH/PDSCH on SSB symbols to be measured for radio link monitoring.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band due to radio link monitoring performed on FR1 serving PCell or PSCell in the same band. 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 Scheduling availability of UE during radio link monitoring

When the reference signal to be measured for RLM has different subcarrier spacing than PDSCH/PDCCH and on frequency range FR2, 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 UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UE 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 receive PDCCH/PDSCH on SSB symbols to be measured for radio link monitoring.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band due to radio link monitoring performed on FR1 serving PCell or PSCell in the same band. 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 type-D QCLed with active TCI state for PDCCH/PDSCH, and N=1 applies for the RLM-RS as specified in section 8.1.2.2 if the RLM-RS is SSB and in section 8.1.3.2 if the RLM-RS is CSI-RS
 - There are no scheduling restrictions due to radio link monitoring based on SSB or CSI-RS with a same subcarrier spacing as PDSCH/PDCCH.
 - When performing radio link monitoring based on SSB with a different subcarrier spacing than PDSCH/PDCCH, for UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring. For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for radio link monitoring.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on RLM-RS symbols to be measured for radio link monitoring.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band due to radio link monitoring performed on FR2 serving PCell or PSCell in the same band.

Editor's Note: FFS scheduling restrictions for inter-band carrier aggregation will be defined depending on band combination in future.

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

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.

8.2 Interruption

8.2.1 NSA: Interruptions with EN-DC

8.2.1.1 Introduction

This section 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

This section also contains the requirements related to the interruptions on other active serving cells in the same frequency range wherein the UE is performing BWP switching.

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

This section 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 [15].

For a UE which does not support per-FR measurement gaps, interruptions to the PSCell or active 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 active 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.

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

11	NR Slot	Interruption length X	
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.

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 is added or released:

- an interruption on any activated serving cell in SCG:
 - of up to X1 slot, if the activated serving cell is not in the same band as any of the E-UTRA SCells being added or released, or
 - of up to $max\{Y1 \text{ slot} + T_{SMTC_duration}, 5ms\}$ if the activated 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 activated 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 activated serving cells in SCG;

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

When one SCell is added or released:

- an interruption on any activated serving cell in SCG:
 - of up to X1 slot, if the activated 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 activated serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the activated 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 activated serving cells in SCG and the SCell being added when one SCell is added;
 - the longest SMTC duration among all above activated serving cells in SCG when one SCell is released.

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

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

Ш	NR Slot	Interruption length X1 slot		Interruption length Y1
μ	length (ms)	Sync	Async	slot ^{Note 1}
0	1	1	2	1
1	0.5	2	3	2
2	0.25	5		4
3	0.125	9		8

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

μ	NR Slot length (ms)	Interruption length X1 slot	Interruption length Y1 slot ^{Note}
0	1	1	1
1	0.5	2	2
2	0.25	4	4
3	0.125	8	8

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 is activated or deactivated:

- an interruption on any activated serving cell in SCG:
 - of up to X2 slot, if the activated 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 activated 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 activated 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 activated serving cells in SCG.

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

When one SCell is activated or deactivated:

- an interruption on any serving cell in SCG:
 - of up to X2 slot, if the activated 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 activated serving cells are in the same band as any of the SCells being activated or deactivated, provided the cell specific reference signals from the activated 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 activated serving cells in SCG and the SCell being activated when one SCell is activated;
 - the longest SMTC duration among all above activated serving cells in SCG when one SCell is deactivated.

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

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

μ	NR Slot	Interruption length X2 slot		Interruption length Y2 slot
μ μ	length (ms)	Sync	Async	
0	1	1	2	1
1	0.5	1	2	1
2	0.25	3		2
3	0.125	5		4

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

μ	NR Slot length (ms)	Interruption length X2 slot	Interruption length Y2 slot
0	1	1	1
1	0.5	1	1
2	0.25	2	2
3	0.125	4	4

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 active 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* [2] 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* [2] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [2].

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 8.2.1.2.5-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length (ms)	Interruption length X3 slot	Interruption length Y3 slot
0	1	1	1
1	0.5	1	1
2	0.25	2	2
3	0.125	4	4

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 [2].

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

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

8.2.1.2.7 Interruption due to Active BWP switching Requirement

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 8.2.1.2.7-2and 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 $T_{\text{BWPswitchDelay}}$ 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 [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.

Editor's note: FFS whether interruption core requirement for RRC re-configuration with BWP switch and/or MAC-based BWP switching (upon initiation of random access procedure in certain cases) is needed. Editor's note: FFS whether one more interrupted slot is allowed when the interrupted serving cells and the serving cell that UE is performing BWP switching are in the same band,

Table 8.2.1.2.7-1: 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 larger one 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		
maxNrofCodeWordsScheduledByDCI	From TS 38.331 [2]	
nrofSRS-Ports		
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 section contains the requirements related to the interruptions on PCell and activated SCell if configured, when up to TBD SCells are configured, deconfigured, activated or deactivated.

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.

This section also contains the requirements related to the interruptions on other active serving cells in the same frequency range wherein the UE is performing BWP switching.

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 TBD is added or released using the same *RRCConnectionReconfiguration* message as defined in [2], the UE is allowed an interruption on any activated serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any activated serving cell:
 - of up to the duration shown in table 8.2.2.2.1-1, if the activated 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 activated serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the activated 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)	Interruption length (slot)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

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

μ	NR Slot length (ms)	Interruption length (slot)	
0	1	1 + T _{SMTC_duration}	
1	0.5	2 + T _{SMTC_duration}	
2	0.25	4 + T _{SMTC_duration}	
3	0.125	8 + T _{SMTC_duration}	
Note:	Tsmtc_duration is - the longest SMTC duration among all above activated serving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all activated serving cells in the same band when one SCell is released.		

8.2.2.2.2 Interruptions at SCell activation/deactivation

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

- an interruption on any activated serving cell:
 - of up to the duration shown in table 8.2.2.2.2-1, if the activated 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 activated serving cells are in the same band as any of the SCells being activated or deactivated provided the cell specific reference signals from the activated serving cells and the SCells being activated or deactivated are available in the same slot.

Table 8.2.2.2-1: Interruption duration for SCell activation/deactivation for inter-band CA

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

NR Slot Interruption length μ length (ms) 1 + T_{SMTC_duration} 0 1 0.5 1 1 + T_{SMTC_duration} 2 0.25 2 + T_{SMTC} duration 0.125 4 + T_{SMTC_duration} Note: T_{SMTC_duration} is - the longest SMTC duration among all above activated serving cells and the SCell being activated when one SCell is activated; - the longest SMTC duration among all activated serving cells in the same band

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

8.2.2.2.3 Interruptions during measurements on SCC for intra-band CA

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.

when one SCell is deactivated.

Interruptions on active 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 8.2.2.2-1 if the active SCell is not in the same band as the deactivated SCell. Each interruption shall not exceed requirement in Table 8.2.2.2-2 if the active 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 [2].

When an UL carrier or supplementary UL carrier is configured or deconfigured, an interruption on PCell and all activated SCells within the same FR as the reconfigured uplink carrier of up to the duration shown in table 8.2.2.2.4-1, is allowed during the RRC reconfiguration procedure [2]. 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
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.2.2.5 Interruption due to Active BWP switching Requirement

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.2.5-2, 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 $T_{BWPswitchDelay}$ 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 [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_{BWPswitchDelay} as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving other parameter change.

Editor's note: FFS whether interruption core requirement for RRC re-configuration with BWP switch and/or MAC-based BWP switching (upon initiation of random access procedure in certain cases) is needed.

Editor's note: FFS whether one more interrupted slot is allowed when the interrupted serving cells and the serving cell that UE is performing BWP switching are in the same band,

NR Slot Interruption length X length (ms) (slotsnote 1) 0 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 larger one between the SCS before BWP switch and the SCS after the BWP switch.

Table 8.2.2.2.5-1: Interruption length X

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

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

8.3 SCell Activation and Deactivation Delay

8.3.1 Introduction

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

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

8.3.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this section shall apply for the UE configured with one downlink SCell in SCG in EN-DC, or in standalone NR carrier aggregation 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_{HARQ} + $T_{activation_time}$ + $T_{CSI_Reporting}$], where:

T_{HARO} is the timing between DL data transmission and acknowledgement as specified in [7].

Tactivation_time is the SCell activation delay. If the SCell is known and belongs to FR1, Tactivation_time is:

- [T_{SMTC SCell} + 5ms], if the SCell measurement cycle is equal to or smaller than [160ms].
- [T_{SMTC_MAX} + T_{SMTC_SCell} + 5ms], if the SCell measurement cycle is larger than [160ms].

If the SCell is unknown and belongs to FR1, T_{activation time} is:

- $[2*T_{SMTC_MAX} + 2*T_{SMTC_SCell} + 5ms]$ provided the SCell can be successfully detected on the first attempt.

If the SCell being activated belongs to FR2, Tactivation time is:

- [T_{SMTC_SCell} + 5ms] if there is at least one active serving cell on that FR2 band, provided that the SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in section 3.6.3.
- [TBD* T_{SMTC_SCell} + 5ms] if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1.

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_{SMTC SCell}: SMTC periodicity of SCell being activated and the minimum value is 10ms.

T_{CSI_reporting} is the delay 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 [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 section 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 section 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

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 [2] for an SCell at the first opportunities for the corresponding actions once the SCell is activated.

The interruption on PSCell or any activated SCell in SCGfor EN-DC mode specified in section 8.2 shall not occur before slot $n+1+[T_{HARQ}]$ and not occur after slot $n+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}]$.

The interruption on PCell or any activated SCell in MCG for NR standalone mode specified in section 8.2 shall not occur before slot $n+1+[T_{HARO}]$ and not occur after slot $n+1+[T_{HARO}+3ms+T_{SMTC}]$.

Starting from the slot specified in section 4.3 of [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.

8.3.3 SCell Deactivation Delay Requirement for Activated SCell

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

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 $n+[T_{HARO}+3ms]$.

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

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

8.4 UE UL carrier RRC reconfiguration Delay

8.4.1 Introduction

The requirements in this section 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 x.y in TS 38.331 [2] plus the interruption time specified in section 8.2.1.2.6.

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 x.y in TS 38.331 [2].

8.5 Link Recovery Procedures

8.5.1 Introduction

The UE shall assess the downlink 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 instance. The RS resources 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.

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

The threshold Q_{out_LR} is defined as the level at which the downlink radio level link 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.

The UE shall perform L1-RSRP measurements based on the reference signal in the set \overline{q}_1 as specified in TS 38.213 [3] in order to detect candidate beam with L1-RSRP measurement that is better than the threshold indicated by higher layer parameter rsrp-ThresholdSSB and rsrp-ThresholdCSI-rs (rsrp-ThresholdSSB + powerControlOffsetSS). The RS resources in the set \overline{q}_1 can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS. UE is not required to perform candidate beam detection outside the active DL BWP.

On each RS resource in the set \overline{q}_1 , the UE shall perform L1-RSRP measurements and compare it to the threshold rsrp-ThresholdSSB or rsrp-ThresholdCSI-rs for the purpose of selecting new beam(s) for beam failure recovery.

UE is not expected to perform beam failure detection measurements if the SCS of the CSI-RS used for beam failure detection and the SCS of the SSB used for beam failure detection are different, and the CSI-RS and SSB are FDM-ed in the same OFDM symbol.

Editor's Note: FFS: whether UE supporting simultaneousRxDataSSB-DiffNumerology can perform BFD on SSB and CSI-RS simultaneously.

8.5.2 Requirements for SSB based beam failure detection

8.5.2.1 Introduction

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

Value for BLER **Attribute** DCI format 1-0 Number of control OFDM 2 symbols Aggregation level (CCE) 8 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 (MHz) TBD 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

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

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 $T_{\text{Evaluate BFD SSB}}$ is defined in Table 8.5.2.2-2 for FR2 with N=8

For FR1,

- P=1/(1 T_{SSB}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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=1/(1 T_{SSB}/T_{SMTCperiod}), when BFD-RS is not overlapped with measurement gap and BFD-RS is partially overlapped with SMTC occasion (T_{SSB} < T_{SMTCperiod}).
- P is $P_{\text{sharing factor}}$, when BFD-RS is not overlapped with measurement gap and BFD-RS is fully overlapped with SMTC period ($T_{\text{SSB}} = T_{\text{SMTCperiod}}$).
- P is $1/(1-T_{SSB}/MGRP-T_{SSB}/T_{SMTCperiod})$, when BFD-RS is partially overlapped with measurement gap and BFD-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
 - $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $1/(1-T_{SSB}/MGRP)^*$ $P_{sharing\ factor}$, when BFD-RS is partially overlapped with measurement gap and BFD-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 $T_{SSB} = 0.5*T_{SMTCperiod}$
- P is 1/{1- T_{SSB} /min (T_{SMTCperiod} ,MGRP)}, when BFD-RS is partially overlapped with measurement gap (T_{SSB} <MGRP) and BFD-RS is partially overlapped with SMTC occasion (T_{SSB} < T_{SMTCperiod}) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $1/(1-T_{SSB}/MGRP)^*$ $P_{sharing\ factor}$, when BFD-RS is partially overlapped with measurement gap and BFD-RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 3$.

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*.

Longer evaluation period would be expected if the combination of BFD-RS, 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*P)*T _{SSB})	
DRX cycle ≤ 320ms	max([50], ceil(7.5*P)*max(T _{DRX} ,T _{SSB}))	
DRX cycle > 320ms	ceil(5*P)*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_out} for FR2

Configuration	T _{Evaluate_BFD_SSB} (ms)	
no DRX	max([50], ceil(5*P*N)*T _{SSB})	
DRX cycle ≤ 320ms	max([50], ceil(7.5*P*N)*max(T _{DRX} ,T _{SSB}))	
DRX cycle > 320ms	ceil(5*P*N)*T _{DRX}	
Note: T _{SSB} is the periodicity of SSB in the set \overline{q}_0 . T _{DRX} is the DRX cycle length.		

8.5.3 Requirements for CSI-RS based beam failure detection

8.5.3.1 Introduction

The requirements in this section apply for each CSI-RS resource in the set \overline{q}_0 configured for a serving cell, provided that the CSI-RS resource configured for beam failure detection are actually transmitted within the UE active DL BWP during the entire evaluation period specified in section 8.5.3.2. UE is not expected to perform beam failure detection measurements on the CSI-RS configured as BFD-RS if the CSI-RS is not QCL-ed with 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 (MHz)	TBD
Sub-carrier spacing (kHz)	TBD
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 configured CSI-RS resource in set \overline{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 CSI-RS for BFD is QCL-TypeD with SSB for L1-RSRP beam reporting, and the CSI-RS for BFD and SSB for L1-RSRP beam reporting are TDM'd, and the CSI-RS for BFD is not in a resource set configured with repetition ON.

Or

- the CSI-RS for BFD is QCL-TypeD with CSI-RS for L1-RSRP beam reporting with repetition parameter ON, and the CSI-RS for BFD and CSI-RS for L1-RSRP beam reporting are TDM'd, and the CSI-RS for BFD is not in a resource set configured with repetition ON.

Editor's Note: It is FFS if N=1 can apply if the QCL-ed CSI-RS for L1-RSRP beam reporting is configured with repetition parameter "OFF".

- N=8, otherwise.

For FR1,

- $P=1/(1-T_{CSI-RS}/MGRP)$, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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 BFD-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=1/(1-T_{CSI-RS}/MGRP)$, when BFD-RS is partially overlapped with measurement gap and BFD-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P=1/(1-T_{CSI-RS}/T_{SMTCperiod})$, when BFD-RS is not overlapped with measurement gap and BFD-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).

- P is $P_{\text{sharing factor}}$, when BFD-RS is not overlapped with measurement gap and BFD-RS is fully overlapped with SMTC occasion ($T_{\text{CSI-RS}} = T_{\text{SMTCperiod}}$).
- P is 1/(1- T_{CSI-RS} /MGRP T_{CSI-RS} /T_{SMTCperiod}), when BFD-RS is partially overlapped with measurement gap and BFD-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 is $1/(1-T_{CSI-RS}/MGRP)^*$ $P_{sharing\ factor}$, when BFD-RS is partially overlapped with measurement gap and BFD-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 is 1/{1- T_{CSI-RS} /min (T_{SMTCperiod} ,MGRP)}, when BFD-RS is partially overlapped with measurement gap (T_{CSI-RS} < MGRP) and BFD-RS is partially overlapped with SMTC occasion (T_{CSI-RS} < T_{SMTCperiod}) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $1/(1-T_{CSI-RS}/MGRP)^*$ P_{sharing factor}, when BFD-RS is partially overlapped with measurement gap and BFD-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} is 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.

Editor's Note: FFS definition of overlap between CSI-RS for BFD-RS and SMTC

Longer evaluation period would be expected if the combination of BFD-RS, 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 configured for BFD is transmitted with Density = 3.

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

Configuration	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	max([50], [M _{BFD} *P] * T _{CSI-RS})	
DRX cycle ≤ 320ms	max([50], [1.5xM _{BFD} *P]*max(T _{DRX} , T _{CSI-RS}))	
DRX cycle > 320ms	[M _{BFD} *P] * 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	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	max([50], [M _{BFD} *P*N] * T _{CSI-RS})	
DRX cycle ≤ 320ms	max([50], [1.5×M _{BFD} *P*N]*max(T _{DRX} , T _{CSI-RS}))	
DRX cycle > 320ms	[M _{BFD} *P*N] * 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.		

8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the configured RS resources in set \overline{q}_0 is worse than $Q_{\text{out_LR}}$, 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 [2].

The beam failure instance evaluation for the configured RS resources in set \overline{q}_0 shall be performed as specified in section 6 in [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, $T_{BFD-RS,M}$), where $T_{BFD-RS,M}$ is the shortest periodicity of all configured RS resources in set \overline{q}_0 for the accessed cell, corresponding to either the shortest periodicity of the SSB in the set \overline{q}_0 or CSI-RS resource in the set \overline{q}_0 .

When DRX is used, $T_{Indication_interval_BFD}$ is max(1.5*DRX_cycle_length, 1.5* $T_{BFD-RS,M}$) 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.

8.5.5 Requirements for SSB based candidate beam detection

8.5.5.1 Introduction

The requirements in this section apply for each SSB resource in the set \bar{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 section 8.5.5.2.

8.5.5.2 Minimum requirement

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 $T_{\text{Evaluate_CBD_SSB}}$ [ms] period becomes better than the threshold $Q_{\text{in_LR}}$.

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 N=8.

Where,

For FR1,

- P=1/(1 T_{SSB}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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,

- $P=1/(1-T_{SSB}/T_{SMTCperiod})$, 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 3, 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 is $1/(1-T_{SSB}/MGRP-T_{SSB}/T_{SMTCperiod})$, 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 occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $1/(1-T_{SSB}/MGRP)*3$, 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 $T_{SSB} = 0.5*T_{SMTCperiod}$
- P is $1/\{1-T_{SSB}/min\ (T_{SMTCperiod}\ ,MGRP)\}$, 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 is $1/(1-T_{SSB}/MGRP)*3$, 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 ($T_{SMTCperiod} < MGRP$)

[Longer evaluation period would be expected if the SSB is on the same OFDM symbols with RLM/BFD/BM-RS, or other CBD-RS, according to the measurement restrictions defined in section TBD.]

Table 8.5.5.2-1: Evaluation period T_{Evaluate_CBD_SSB} for FR1

Configuration	T _{Evaluate_CBD_SSB} (ms)	
non-DRX	ceil([3]*P) * T _{SSB}	
DRX cycle ≤ 320ms	ceil([3]*P*1.5) * max(T _{DRX} ,T _{SSB})	
DRX cycle > 320ms	ceil([3]*P) * T _{DRX}	
Note: T_{SSB} is the periodicity of SSB in the set \overline{q}_1 . T_{DRX} is the DRX cycle length.		

Table 8.5.5.2-2: Evaluation period $T_{Evaluate_CBD_out}$ for FR2

Configuration	T _{Evaluate_CBD_SSB} (ms)	
non-DRX	ceil([3]*P*N) * T _{SSB}	
DRX cycle ≤ 320ms	ceil([3]*P*N*1.5) * max(T _{DRX} ,T _{SSB})	
DRX cycle > 320ms	ceil([3]*P*N) * T _{DRX}	
Note: T_{SSB} is the periodicity of SSB in the set \overline{q}_1 . T_{DRX} is the DRX cycle length.		

8.5.6 Requirements for CSI-RS based candidate beam detection

8.5.6.1 Introduction

The requirements in this section 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 section 8.5.6.2.

8.5.6.2 Minimum requirement

UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set \overline{q}_l estimated over the last $T_{Evaluate_CBD_CSI-RS}$ [ms] period becomes better than the threshold Q_{in_LR} within $T_{Evaluate_CBD_CSI-RS}$ [ms] period.

The value of T_{Evaluate CBD CSI-RS} is defined in Table 8.5.6.2-1 for FR1.

The value of T_{Evaluate CBD CSI-RS} is defined in Table 8.5.6.2-2 for FR2 with N=8.

Editor's Note: FFS whether N=1 need to be applied for CSI-RS based candidate beam detection in FR2.

For FR1,

- P=1/(1 T_{CSI-RS}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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.
- $P=1/(1-T_{CSI-RS}/MGRP)$, 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=1/(1 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 is 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 is $1/(1-T_{CSI-RS}/MGRP-T_{CSI-RS}/T_{SMTCperiod})$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (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 is $1/(1-T_{CSI-RS}/MGRP)^*$ 3, 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 $T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- P is $1/\{1-T_{CSI-RS}/min(T_{SMTCperiod},MGRP)\}$, 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 is 1/(1-T_{CSI-RS} /MGRP)* 3, 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 section TBD.]

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		TEvaluate_CBD_CSI-RS (MS)	
n	on-DRX	max(TBD, ceil(M _{CBD} *P) * T _{CSI-RS})	
DRX cycle ≤ 320ms		ceil(Mcbd *P*N) * max(Tdrx, Tcsl-rs)	
DRX cycle > 320ms		ceil(M _{CBD} *P) *T _{DRX}	
Note: $T_{\text{CSI-RS}}$ is the periodicity of CSI-RS resource in the set \overline{q}_{I} . T_{DRX} is th			
DRX cycle length.			

Table 8.5.6.2-2: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR2

Con	figuration	T _{Evaluate_CBD_CSI-RS} (ms)	
n	on-DRX	max(TBD, ceil(Mcbd *P*N) * Tcsi-Rs)	
DRX cycle ≤ 320ms		ceil(Mcbd *P*N*1.5) * max(Tdrx, Tcsi-rs)	
DRX cycle > 320ms		ceil(Mcbd *P*N) *Tdrx	
Note:	Note: T_{CSI-RS} is the periodicity of CSI-RS resource in the set $\ \overline{q}_{\rm l}$. T_{{\rm DRX}} is the		
DRX cycle length.			

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 as BFD-RS with the same SCS as PDSCH/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 based on SSB as BFD-RS. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to beam failure detection based on SSB configured as BFD-RS.

- 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 for beam failure detection.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions apply to all SCells that are aggregated in the same band as the PCell or PSCell. 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.

When intra-band carrier aggregation is configured, the following scheduling restrictions apply to all SCells configured in the same band as the PCell and/or PSCell on which beam failure is detected.

- For the case where no RSs are provided for BFD, or where BFD-RS is explicitly configured and is QCLed with active TCI state for PDCCH/PDSCH, and N=1 applies for the BFD-RS as specified in section 8.5.2.2 if the BFD-RS is SSB and in section 8.5.3.2 if the BFD-RS is CSI-RS
 - There are no scheduling restrictions due to beam failure detection performed based on SSB or CSI-RS with a same SCS as PDSCH/PDCCH.
 - When performing beam failure detection based on SSB with a different SCS than PDSCH/PDCCH, for UEs which support simultaneousRxDataSSB-DiffNumerology [14] there are no restrictions on scheduling availability due to beam failure detection. For UEs which do not support simultaneousRxDataSSB-DiffNumerology [14] 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 for beam failure detection.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band due to beam failure detection performed on FR2 PCell or PSCell in the same band. When inter-band carrier aggregation within FR2 is performed, there are no scheduling restrictions on FR2 serving cell(s) in the bands due to beam failure detection performed on FR2 PCell or PSCell in different bands.

Editor's Note: FFS scheduling restrictions for inter-band carrier aggregation will be defined depending on band combination in future.

8.5.7.4 Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-FR2 inter-band CA

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.

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 resourcewith the same SCS as PDSCH/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/SRS or receive PDCCH/PDSCH/TRS/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 apply to all serving cells that are aggregated in the same band as the cell where L1-RSRP measurement is performed. 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 beam failure detection

- For the case where no RSs are provided for beam failure detection, or where beam failure detection RS is explicitly configured and is QCLed with active TCI state for PDCCH/PDSCH, and N=1 applies for the beam failure detection RS as specified in section 8.5.2.2 if the beam failure detection RS is SSB and in section 8.5.3.2 if the beam failure detection RS is CSI-RS
 - There are no scheduling restrictions due to beam failure detection performed based on SSB or CSI-RS with a same SCS as PDSCH/PDCCH.
 - When performing beam failure detection based on SSB with a different SCS than PDSCH/PDCCH, for UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to beam failure detection. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for beam failure detection.
 - The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on BFD-RS symbols to be measured for beam failure detection.

When intra-band carrier aggregation is configured, the scheduling restrictions apply to all serving cells that are aggregated in the same band as the serving cell where L1-RSRP measurement for candidate beam detection is performed.

Editor's Note: FFS scheduling restrictions for inter-band carrier aggregation will be defined depending on band combination in future.

8.5.8.4 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).

8.6 Active BWP switch delay

8.6.1 Introduction

The requirements in this section apply for a UE configured with more than one BWP on PCell or any activated SCell in standalone NR, 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 section.

8.6.2 DCI and timer based BWP switch delay

For DCI-based BWP switch, after the UE receives BWP switching request at 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 occurs no later than at slot n+ T_{BWPswitchDelay}.

For timer-based BWP switch, the UE shall start BWP switch at slot n, where n is the beginning of a subframe (FR1) or 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 occurs no later than at slot n+ T_{BWPswitchDelay}.

The UE is not required to transmit UL signals or receive DL signals during time duration $T_{BWPswitchDelay}$ on the cell where DCI-based BWP switch or timer-based BWP switch occurs.

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.

μ	NR Slot	BWP switch delay T _{BWPswitchDelay} (slots)	
μ	length (ms)	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]	[17]

Table 8.6.2-1: BWP switch delay

Note 1: Depends on UE capability.

Note 2: If the BWP switch involves changing of SCS, the BWP switch delay is determined by the larger one between the SCS before BWP switch and the SCS after BWP switch.

Editor's note: It is FFS if UL BWP switch delay should include the effect of the timing advance. If UE preparation time for UL BWP switch does not take into account of timing advance, the actual allowed UL BWP switch time will be shortened.

8.6.3 RRC based BWP switch delay

For RRC-based BWP switch, after the UE receives BWP switching request, 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 occurs no later than at slot $n + T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$, where slot n is the last slot containing the RRC command, and $T_{RRCprocessingDelay}$ is the length of the RRC procedure delay in slots defined in clause 12 in TS 38.331 [2], and $T_{BWPswitchDelayRRC}$ is the BWP switching delay for RRC based BWP switch.

Editor's Note: T_{BWPswitchDelayRRC} is going to be defined for both cases: 1) BWP switch to another already configured BWP; 2) BWP switch to a newly configured BWP in the same RRC re-configuration massage. FFS whether to define delay requirements for MAC based BWP switch. The UL grant uncertainty for transmitting RRCReconfigurationComplete due to TA and TA offset during RRC based BWP switching is FFS.

8.7 Void

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, and inter-RAT E-UTRAN TDD 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 [16].

In the requirements of Section 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, Section B.3.2.1 for UE supporting CA in FR1, and Section 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, Section B.3.2.2 for UE configured with CA in FR1, and Section 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, Section 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, Section 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 subsections 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 subsections 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 NSA except the reception of signals used for RRM measurement
- is not required to conduct reception/transimssion from/to the corresponding NR serving cells for SA except the reception of signals used for RRM measurement

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 NSA except the reception of signals used for RRM measurement
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA except the reception of signals used for RRM measurement

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 [2] and [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		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

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
229	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
Per FR	FR2 if configured		12-23
measurement gap	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	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	non-NR RAT Note1,2	0, 1, 2, 3, 4, 6, 7, 8,10
	configured	and FR1 and FR2	
	FR2 if configured		12-23

Note: if GSM or UTRA TDD or UTRA FDD inter-RAT frequency layer is configured to be monitered, 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: Non-NR RAT includes E-UTRA, UTRA and/or GSM.
- NOTE 2: The gap patterns with short MGL (gap pattern #2, 3, 6, 7, 8, 10) are supported by UEs which support shortMeasurementGap-r14.
- 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.
- 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 E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.

If per-FR measurenet 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- $\bar{F}R$ measuremet 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.

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.

For per-FR measurement gap capable UE configured with E-UTRA-NR 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 UE, when serving cells are in E-UTRA, FR1 and FR2, or in E-UTRA 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

Measurement gap pattern configuration	Serving cell	Measurement Purpose NOTE 2	Applicable Gap Pattern Id
		E-UTRA only ^{NOTE3}	0,1,2,3
	FR1, or FR1 + FR2	FR1 and/or FR2	0-11
Per-UE measurement gap		E-UTRAN and	0, 1, 2, 3, 4, 6, 7, 8,10
		FR1 and/or FR2	
		E-UTRA only NOTE3	0,1,2,3
	FR2	FR1 only	0-11
		FR1 and FR2	0-11

		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
	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: The measurement gap pattern #2, 3, 6, 7, 8, 10 are supported by the UEs which indicate the capability signalling of supportedGapPattern to network.

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 measuremet 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.

For per-FR measurement gap capable UE in NR standalone operation, for per-FR gap based measurement, when there is no serving cell in a particular FR, where measurements objects are configured, regardless if explicit per-FR measurement gap is configured in this FR, the effective MGRP in this FR used to determine requirements;

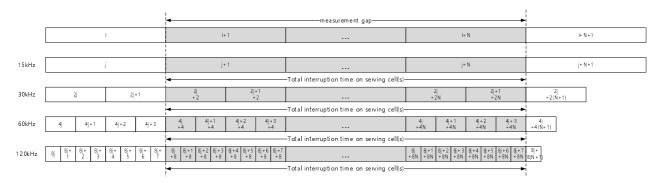
- 20ms for FR2 NR measurements
- 40ms for FR1 NR measurements
- 40ms for LTE measurements
- 40ms for FR1+LTE measurements

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.

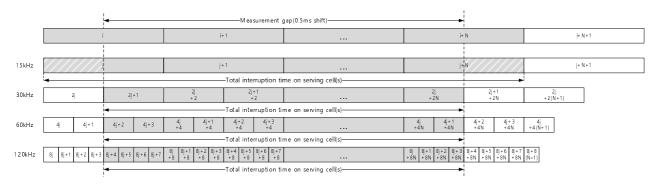
For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 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, if UE is not capable of per-FR-gap, total interruption time on a serving cell 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 during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells

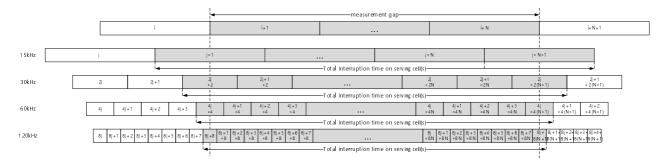
during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.



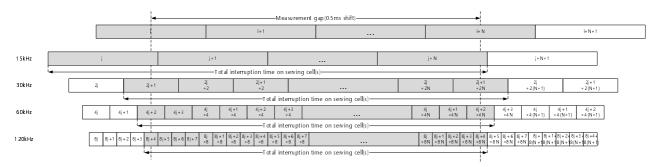
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC and NR standalone



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC and NR standalone



(c) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for asynchronous EN-DC



(d) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for asynchronous EN-DC

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC and NR standalone

The corresponding total number of interrupted slots on serving cells is listed in Table 9.1.2-4 and Table 9.1.2-4a for synchronous EN-DC and NR standalone, and asynchronous EN-DC respectively.

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC and NR standalone 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	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	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 :	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 implen	nentation.					

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	25 17 13			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 o	f 120 kHz is o	nly applicable	to the case wi	th per-UE mea	asurement

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 and NR standalone with per-FR measurement gap for FR2

NR		Total number of interrupted slots on FR2 serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG ti	ming advance applied	of 0.25ms is	
	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	

In the slot occurring immediately after measurement gap and fully non-overlapped with measurement gap

- It is up to UE implementation whether or not the UE is able to conduct transmission if all the symbols in the slot are uplink symbols.

Editor notes: FFS if very large TA is applied.

gap.

Table 9.1.2-5: (Void)

9.1.2.1 NSA: 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", where X is a signalled RRC parameter *measGapSharingConfig* [2][16]and is defined as in Table 9.1.2-5,

- the performance of intra-frequency measurements with no measurement gaps as specified in section 9.2.5, when SMTC configured for intra-frequency measurement are fully overlapping with measurement gaps, shall consider the factor $K_{intra} = 1/X * 100$,
- the performance of intra-frequency measurements with measurement gaps as specified in section 9.2.6 shall consider the factor $K_{intra} = 1 / X * 100$,
- the performance of inter-frequency measurement as specified in section 9.3 and the performance of inter-RAT measurement as specified in section 9.4 shall consider the factor $K_{inter} = 1 / (100 X) * 100$,

When network signals "00" indicating equal splitting gap sharing, X is not applied and the performance of intrafrequency measurements as specified in section 9.2.5 and section 9.2.6, the performance of inter-frequency measurement as specified in section 9.3 and the performance of inter-RAT measurement as specified in section 9.4 are FFS.

measGapSharingConfigValue of X (%)'00'Equal splitting'01'25'10'50

'11'

Table 9.1.2.1-1: Value of parameter X for EN-DC measurement gap sharing

75

9.1.2.1a SA: Measurement Gap Sharing

For NR standalone 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, and/or inter-RAT E-UTRAN carriers.

For NR standalone 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 and/or inter-RAT E-UTRAN carriers.

For NR standalone 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", where X is a signalled RRC parameter *measGapSharingConfig* [2] and is defined as in Table 9.1.2-5,

- the performance of intra-frequency measurements with no measurement gaps as specified in section 9.2.5, when SMTC configured for intra-frequency measurement are fully overlapping with measurement gaps, shall consider the factor $K_{intra} = 1/X * 100$,
- the performance of intra-frequency measurements with measurement gaps as specified in section 9.2.6 shall consider the factor $K_{intra} = 1 / X * 100$,
- the performance of inter-frequency measurement as specified in section 9.3 and the performance of inter-RAT measurement as specified in section 9.4 shall consider the factor $K_{inter} = 1 / (100 X) * 100$,

When network signals "00" indicating equal splitting gap sharing, X is not applied and the performance of intra-frequency measurements as specified in section 9.2.5 and section 9.2.6, the performance of inter-frequency measurement as specified in section 9.3 and the performance of inter-RAT measurement as specified in section 9.4 are FFS.

Table 9.1.2.1a-1: Value of parameter X for NR standalone measurement gap sharing

measGapSharingConfig	Value of X (%)
'00'	Equal splitting
'01'	25
'10'	50
'11'	75

9.1.3 UE Measurement capability

9.1.3.1 NSA: Monitoring of multiple layers using gaps

The requirements in this section are applicable for UE capable of E-UTRA-NR dual connectivity operation with E-UTRA PCell.

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 E-UTRA-NR dual connectivity operation, the effective total number of frequencies excluding the frequencies of the PSCell, SCells, E-UTRA PCell, and E-UTRA SCells being monitored is $N_{\text{freq, NSA}}$, which is defined as:

 $N_{\rm freq,\,NSA} = N_{\rm freq,\,NSA,\,NR} + N_{\rm freq,\,NSA,\,E-UTRA} + N_{\rm freq,\,NSA,\,UTRA} + M_{\rm NSA,\,GSM},$

where

 $N_{\text{freq, NSA, E-UTRA}}$ is the number of E-UTRA inter-frequency carriers being monitored (FDD and TDD) as configured by E-UTRA PCell or via LPP [22].

 $N_{\text{freq, NSA, NR}} \leq N_{\text{freq, NSA, NR, inter-RAT}} + N_{\text{freq, NSA, NR, inter-freq}}$

where

 $N_{\text{freq, NSA, NR, inter-RAT}}$ is the number of NR inter-RAT carriers excluding NR serving carrier(s) being monitored as configured by E-UTRA PCell [15]

 $N_{\text{freq, NSA, NR, inter-freq}}$ is the number of NR inter-frequency carriers being monitored as configured by PSCell

 $N_{\text{freq, NSA, UTRA}}$ is the number of UTRA inter-RAT carriers being monitored as configured by E-UTRA PCell (FDD and TDD)

 $M_{NSA, GSM}$ 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. $M_{NSA, GSM}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{NSA, GSM}$ is equal to 1 if cells on up to 32 GSM

carriers are being measured. For a MGRP of 80 ms, $M_{NSA, GSM}$ 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 section are applicable for UE configured with at least a PCell.

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_{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_{freq, SA, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell.

9.1.3.2 NSA: Maximum allowed layers for multiple monitoring

If a UE is configured with E-UTRA-NR dual connectivity 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 configure 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 subcarrier spacing or
- 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 Section 9.1.3.2 and Section 8.1.2.1.1b.1 of [15].

NOTE 2: Void

Editor's note: FFS when the E-UTRA PCell and PSCell configure the same NR carrier frequency layer to be monitored, whether this layer shall be counted only once under the condition that the UE is configured with differences in SMTC configurations or different useServingCellTimingForSync indications.

9.1.3.2a SA: Maximum allowed layers for multiple monitoring

If a UE is configured with at least a PCell, 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.

9.1.4 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 Section 9.1.4.2, the UE shall meet all other performance requirements defined in Section 9 and Section 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 section 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: $E_{cat,NSA,NR} + E_{cat,NSA,E-UTRA}$, where

 $E_{\it cat,NSA,NR} = 10 + 9 \times n$ is the total number of NR reporting criteriaapplicable 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,

 $E_{cat,NSA,E-UTRA}$ is the total number of reporting criteria for E-UTRA PCell as specified in TS 36.133 [15] for UE configured with EN-DC,

- For UE not configured of EN-DC: $E_{cat.SA.NR} + E_{cat.SA.E-UTRA}$, 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 E-UTRA inter-RAT 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	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	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)	10	Only applicable for UE with this (inter-RAT) capability when the UE is not configured with EN-DC operation.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSTD	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 and when the UE is not configured with EN-DC operation.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSRP and RSRQ measurements for E-CID	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 and when the UE is not configured with EN-DC operation.

NOTE 1: When the UE is configured with PSCell and SCell carrier frequencies, E_{cat} for Intra-frequency is applied per serving frequency.

9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scale the measurement delay requirements given in Section 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

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 Section 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 Section 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 and smtc2 is partially overlapping with measurement gaps, $CSSF_{outside_gap_i}$ and requirements derivied from $CSSF_{outside_gap_i}$ are not specified.

9.1.5.1.1 NSA 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.

Editor's note: CSSF_{outside_gap,i} for SCells on FR1 assumes that all Scell SMTC are overlapping(definition FFS). CSSF_{outside_gap,i} definition may be revised for non overlapping Scell SMTCs.

Table 9.1.5.1.1-1: CSSF_{outside_gap,i} scaling factor in NSA 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	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.

9.1.5.1.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with the SA 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 9.1.5.1.2-1.

Editor's note: CSSF_{outside_gap,i} for SCells on FR1 assumes that all Scell SMTC are overlapping(definition FFS). CSSF_{outside_gap,i} definition may be revised for non overlapping Scell SMTCs.

Table 9.1.5.1.2-1: CSSF_{outside gap,i} scaling factor in 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	2×(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.

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 with no measurement gap in Section 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with measurement gap in Section 9.2.6.
- Inter-frequency measurement in Section 9.3
- Inter-RAT measurement in Section 9.4

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 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 NSA 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 section.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms, 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 are derived as below.

For each measurement gap *j* not used for an RSTD measurement with periodicity Tprs>160ms 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 carrier is a candidate to be measured in a gap if its SMTC occasion fully occurs in time within the considered measurement gap excluding RF switching time. For intrafrequency NR carriers, if the high 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 interRAT measurement object is a candidate to be measured in all meausrement gaps.

 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 within an arbitrary 1280ms period.

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.

Per gap *j*:

 $M_{intra,i,j}$: Number of intrafrequency 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 interfrequency measurement objects or NR interRAT measurement objects configured by E-UTRA PCell, EUTRA interfrequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects and GSM interRAT 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 intrafrequency, interfrequency and interRAT 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.

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 intrafrequency 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 interfrequency or interRAT 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

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 section.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms, 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 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 carrier is a candidate to be measured in a gap if its SMTC occasion fully occurs in time within the considered measurement gap excluding RF switching time. For intrafrequency NR carriers, if the high 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 interRAT measurement object is a candidate to be measured in all meausrement gaps.

 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 within an arbitrary 1280ms period.

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.

Per gap *j*:

 $M_{intra,i,j}$: Number of intrafrequency 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 interfrequency and EUTRA interRAT 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 intrafrequency, interfrequency and interRAT 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.

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 intrafrequency 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 interfrequency or interRAT 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

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 Section 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 SSB 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 section 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC) 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 Section 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 Sections 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in Sections 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in Sections 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, the UE shall be capable of monitoring at least 8 cells.

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of monitoring at least [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 no smaller than the number of configured RLM-RS SSB resources.

9.2.3.2 Requirements for FR2

For each intra-frequency layer the UE shall be capable of monitoring at least 6 cells on a single serving carrier (PCC or PSCC or 1 SCC if PCC/PSCC is in a band different from SCC) out of all the serving carriers configured in the same band.

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of monitoring at least 24 SSB with different SSB index and/or PCI on a single serving carrier (PCC or PSCC or 1 SCC if PCC/PSCC is in a band different from SCC) out of all the serving carriers configured in the same band. UE shall be capable of monitoring 2 SSB(s) on serving cell for each of the other serving carrier(s) in the same band. UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR on all above-mentioned SSBs

9.2.4 Measurement Reporting Requirements

9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 10.1.2.1, 10.1.3.1, 10.1.7.1, 10.1.8.1, 10.1.12.1 and 10.1.13.1, respectively.

9.2.4.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in sections 10.1.2.1, 10.1.3.1, 10.1.7.1, 10.1.8.1, 10.1.12.1 and 10.1.13.1, respectively.

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 periodically triggered measurement reports shall meet the requirements in sections 10.1.2.1, 10.1.3.1, 10.1.7.1, 10.1.8.1, 10.1.12.1 and 10.1.13.1, 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 repor

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.

If a cell which has been detectable at least for the time period T $_{identify\ intra\ without\ index}$ or T $_{identify\ intra\ with\ index}$ defined in clause 9.2.5.1 or clause 9.2.6.2 becomes undetectable for a period and then the cell becomes detectable again and triggers an event, the event triggered measurement reporting delay shall be less than $T_{Measurement_Period,\ Intra}$ provided the timing to that cell has not changed more than \pm 3200 Tc while the measurement gap has not been available and the L3 filter 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

Editor's Note: The requirements below have been derived without considering gap sharing when all SMTC occasion are fully overlapping with measurement gaps.

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* 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 section 9.1.5.1 for measurement conducted outside measurement gaps or according to $CSSF_{within_gap,i}$ in section 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_w/o_gaps}$: For a UE supporting FR2 power class 1(fixed wireless access), M_{pss/sss_sync} =40. For a UE supporting power class 2(vehicle mounted), $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 3(handheld), $M_{pss/sss_sync_w/o_gaps}$ =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 (fixed wireless access), $M_{meas_period_w/o_gaps}$ =40. For a UE supporting FR2 power class 2 (vehicle mounted), $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 3 (handheld), $M_{meas_period_w/o_gaps}$ =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, Kp=1

When intrafrequency SMTC is partially overlapping with measurent gaps, Kp = 1/(1 - (SMTC period / MGRP)), where SMTC period < MGRP

If the higher layer signaling in TS 38.331 [2] signaling of smtc2 is present and smtc1 is fully overlapping with measurement and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$

For FR2 when RLM-RS outside measurement gap is fully overlapping with intra-frequency SMTC, K_{RLM} = 1.5, otherwise K_{RLM} =1.

Editor's note: It is FFS how requirements are defined for the case that SMTC are fully overlapping with measurement gap

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			
	CSSFintra			
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 _{RLM}) 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 _{RLM}) x max(SMTC period,DRX cycle)] x CSSF _{intra}
DRX cycle>320ms	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p x K _{RLM}) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured the one used by the cell being identified	for different cells, the SMTC period in the requirement is

Table 9.2.5.1-3: Time period for time index detection (Frequency range FR1)

DRX cycle	Tssb_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	j				

Table 9.2.5.1-4: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR1)

DRX cycle	T _{PSS} /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	T _{PSS/SSS_sync_intra}
No DRX	M _{pss/sss_sync_w/o_gaps} x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	M _{pss/sss_sync_w/o_gaps} x max(measCycleSCell,
	1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Mpss/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	Tssb_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

Editor's Note: The requirements below have been derived so far assuming no configured Scell or E-UTRA SCell. The requirements when one or more SCells or E-UTRA SCells are configured is for further study. The requirements below have been derived without considering gap sharing when all SMTC occasion are fully overlapping with measurement gaps.

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 TS 38.331 [2] signaling 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_peiod_intra}
No DRX	max[200ms, ceil(5 x K _p) x SMTC period] ^{Note 1} x
	CSSFintra
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 _{RLM}) x
	SMTC period]Note 1 x CSSFintra
DRX cycle≤ 320ms	max[400ms, ceil(1.5x M _{meas_period_w/o_gaps} x K _p x K _{RLM}) x
	max(SMTC period,DRX cycle)] x CSSF _{intra}
DRX cycle>320ms	ceil(M _{meas_period_w/o_gaps} xK _p x K _{RLM}) x DRX cycle x
	CSSFintra
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	Mmeas_period with_gaps x measCycleSCell x CSSFintra
DRX cycle≤ 320ms	M _{meas_period with_gaps} x max(measCycleSCell, 1.5xDRX
	cycle) x CSSF _{intra}
DRX cycle> 320ms	M _{meas_period with_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 the measurement signal has different subcarrier spacing than PDSCH/PDCCH or on frequency range FR2, there are restrictions on the scheduling availability as described in the following clauses.

9.2.5.3.1 Scheduling availability of UE performing measurements with a same subcarrier spacing as PDSCH/PDCCH on FR1

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

9.2.5.3.2 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to measurements. 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 and 1 data symbol after each consecutive SSB symbols within SMTC window duration. If the high layer in TS 38.331 [2] signaling of smtc2 is configured, the SMTC periodicity follows smtc2; Otherwise 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 in TS 38.331 [2] signaling of *smtc2* is configured, the SMTC periodicity follows *smtc2*; Otherwise SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band. When inter-band carrier aggregation within FR1 is performed, there are no scheduling restrictions on FR1 serving cell(s) in the bands due to measurements performed on FR1 serving cell frequency layer in different bands.

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 symbol before each consecutive SSB symbols and 1 data symbol after each consecutive SSB symbols within SMTC window duration (The signaling *deriveSSB_IndexFromCell* is always enabled for FR2). If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, the SMTC periodicity follows *smtc2*; Otherwise SMTC periodicity follows *smtc1*.

The following scheduling restriction applies to SS-RSRQ measurement on an FR2 intra-frequency cell

- 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/RSSI symbols and 1 data symbol after each consecutive SSB/RSSI symbols within SMTC window duration (The signaling deriveSSB_IndexFromCellc is always enabled for FR2). If the high layer in TS 38.331 [2] signaling of smtc2 is configured, the SMTC periodicity follows smtc2; Otherwise SMTC periodicity follows smtc1.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band. When inter-band carrier aggregation within FR2 is performed, the scheduling restrictions apply to all serving cells on the bands.

Editor's Note: FFS scheduling restrictions for inter-band carrier aggregation will be defined depending on band combination in future.

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.

9.2.6 Intrafrequency measurements with measurement gaps

9.2.6.1 Void

9.2.6.2 Intrafrequency cell identification

Editor's Note: The impact of gap sharing between intrafrequency and interfrequency measurements has not been include in the requirements below.

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 section [9.1.5.2] for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_with_gaps}$: For a UE supporting FR2 power class 1(fixed wireless access), $M_{pss/sss_sync_with_gaps}$ =40. For a UE supporting FR2 power class 2(vehicle mounted), $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting FR2 power class 3(handheld), $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting power class 4, $M_{pss/sss_sync_with_gaps}$ =[24]

 $M_{meas_period_with_gaps}$: For a UE supporting power class 1(fixed wireless access), $M_{meas_period_with_gaps}$ =40. For a UE supporting power class 2(vehicle mounted), $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 3(handheld), $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_with_gaps}$ =[24].

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 9.2.6.1-1, Table 9.2.6.1-2, and Table 9.2.5.1-3 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 CSSFintra
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	TPSS/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 Mpss/sss_sync_with_gaps) x
-	max(MGRP, SMTC period, DRX cycle)] x CSSF _{intra}
DRX cycle>320ms	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
	CSSFintra

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 9.2.6.2-4: VoidTable 9.2.6.2-5: VoidTable 9.2.6.2-6: VoidTable 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

9.2.6.3 Intrafrequency Measurement Period

Editor's Note: The requirements below have been derived so far assuming no configured Scell or E-UTRA SCell. The requirements when one or more SCells or E-UTRA SCells are configured is for further study. The impact of gap sharing between intrafrequency and interfrequency measurements has not been include in the requirements below.

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.

Editor's note: The values of X, Y and N in the following tables are to be updated.

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
	CSSFintra
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}

Table 9.2.6.3-3: VoidTable 9.2.6.3-4: Void

9.3 NR inter-frequency measurements

9.3.1 Introduction

A measurement is defined as a SSB based inter-frequency measurement provided it is not defined as in intra-frequency measurement according to section 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 the 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 start earlier than the gap starting time + switching time, nor detect SSB which end 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 and SA, 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, the switching time is 0,25ms Otherwise the switching time is 0.5ms.

9.3.2 Requirements applicability

The requirements in Section 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 Sections 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in Sections 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in Sections 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, the UE shall be capable of monitoring at least 4 cells.

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of monitoring at least 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, the UE shall be capable of monitoring at least 4 cells.

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of monitoring at least 10 SSBs with different SSB index and/or PCI on the inter-frequency layer. The UE shall be capable of monitoring at least one SSB per 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 $T_{identify_inter_without_index}$.

$$T_{identify_inter_without_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter}) \ ms$$

$$T_{identify inter with index} = (T_{PSS/SSS sync inter} + T_{SSB measurement period inter} + T_{SSB time index inter}) ms$$

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 (vehicle mounted), M_{pss/sss_sync_inter} =40 samples. For a UE supporting FR2 power class 3 (handheld), 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 power class 1, $M_{SSB_index_inter}$ =[40] samples. For a vehicle mounted UE supporting power class 2 (vehicle mounted), M_{pss/sss_sync_inter} =[24] samples. For a UE supporting power class 3 (handheld), $M_{SSB_index_inter}$ =[24] samples. For a UE supporting power class 4, $M_{meas_period_inter}$ =[TBD] samples.

 $M_{meas_period_inter}$: For a UE supporting FR2 power class 1, $M_{meas_period_inter}$ =64 samples. For a vehicle mounted UE supporting FR2 power class 2 (vehicle mounted), M_{pss/sss_sync_inter} =40 samples. For a UE supporting FR2 power class 3 (handheld), $M_{meas_period_inter}$ =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 section 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	T _{PSS/SSS_sync_inter}
No DRX	max[600ms, [8] x max(MGRP, SMTC period)] x
	CSSF _{inter}
DRX cycle ≤ 320ms	max[600ms, ceil(8x1.5) x max(MGRP, SMTC period,
·	DRX cycle)] x CSSF _{inter}
DRX cycle > 320ms	[8] x DRX cycle x CSSF _{inter}
NOTE 4 DDV DDV :	

NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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, Mpss/sss_sync_inter x max(MGRP, SMTC period)] x CSSF _{inter}	
DRX cycle ≤ 320ms	max[600ms, (1.5 x M _{pss/sss_sync_inter}) x max(MGRP, SMTC period, DRX cycle)] x CSSF _{inter}	
DRX cycle > 320ms	Mpss/sss_sync_inter x DRX cycle x CSSFinter	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1 NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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] x max(MGRP, SMTC period)] x	
	CSSF _{inter}	
DRX cycle ≤ 320ms	max[120ms, ceil(3 x 1.5) x max(MGRP, SMTC period,	
	DRX cycle)] x CSSF _{inter}	
DRX cycle > 320ms	[3] x DRX cycle x CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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, Mssb_index_inter x max(MGRP, SMTC	
	period)] x CSSF _{inter}	
DRX cycle ≤ 320ms	max[200ms, (1.5 x M _{SSB_index_inter}) x max(MGRP, SMTC	
	period, DRX cycle)] x CSSF _{inter}	
DRX cycle > 320ms	M _{SSB_index_inter} x DRX cycle x CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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

9.3.5 Inter frequency measurements

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] x max(MGRP, SMTC period)] x	
	CSSFinter	
DRX cycle ≤ 320ms	max[200ms, ceil(8 x 1.5) x max(MGRP, SMTC period,	
	DRX cycle)] x CSSF _{inter}	
DRX cycle > 320ms	[8] x DRX cycle x CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1		
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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} x max(MGRP, SMTC period)] x CSSF _{inter}	
DRX cycle ≤ 320ms	max[400ms, (1.5 x M _{meas_period_inter}) x max(MGRP, SMTC period, DRX cycle)] x CSSF _{inter}	
DRX cycle > 320ms	M _{meas_period_inter} x DRX cycle x CSSF _{inter}	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in section 3.6.1 NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in section 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 sections 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 sections 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 sections 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.

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 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 filter has not been used. When L3 filtering is used an additional delay can be expected.

9.3.7 Void

9.4 Inter-RAT measurements

9.4.1 Introduction

The requirements in this section 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 at least PCell, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

Parameter T_{Inter1} used in inter-RAT requirements in Section 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 480ms 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 GP2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for GP2, GP4, GP6, GP7, GP10 and Tinter1 = 30 for GP3 and GP8 shall be used. NOTE 2: Measurement gaps pattern configurations applicability is as specified in			

- 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 T_{inter} for E-UTRA interfrequency measurements is 48ms corresponding to the first 3ms of the 4ms gap
- NOTE 4: When this gap pattern is used, the T_{inter} for E-UTRA interfrequency measurements is 24ms corresponding to the first 3ms of the 4ms gap
- NOTE 5: When this gap pattern is used, the T_{inter} for E-UTRA interfrequency measurements is 12ms corresponding to the first 3ms of the 4ms gap
- NOTE 6: This gap pattern is applicable for E-UTRA interfrequency measurements only if gap based NR measurements are also configured.

Editor's note: a note to be added in Table 9.4.1-1 on that measurement gap patterns #2 #3, #6, #7, #8, #10 are supported only by the UEs which have a corresponding capability once RAN2 specifies the capability.

A UE configured with gap pattern Id 2, 3 or 10, shall be able to detect a target cell if the E-UTRA sub frame #0 or #5 of the target cell begins no earlier than [500]uS from the start of the measurement gap and if the E-UTRA sub frame #0 or #5 of the target cell ends no later than [500]uS before the end of the measurement gap in case of FDD, and no later than [750]us 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 if the E-UTRA sub frame #0 or #5 of the target cell begins no earlier than [500]uS from the start of the measurement gap and if the E-UTRA sub frame #0 or #5 of the target cell ends no later than [1500]uS before the end of the measurement gap in case of FDD, and no later than [1750]us before the end of measurement gap in case of TDD.

9.4.2 SA: 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 Section 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 Section 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 Section 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:

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in Section 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 Section 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: T _{Measure, E-UTRAN FDD} [ms]	Measurement bandwidth [RB]
	I Weasure, E-OTRAN FDD [1113]	banawiath [RD]
0	480 x CSSF _{interRAT}	6
1 (Note 1)	240 x CSSF _{interRAT}	50
NOTE 1: This configuration 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 E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer 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 Section 10.2.2.

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in Section 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in Section 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	
	Section 9.4.2.2 apply	Section 9.4.2.2 apply	
0.256	5.12*K (20*CSSFinterRAT)	7.68*K (30*CSSFinterRAT)	
0.32	6.4*K (20*CSSFinterRAT)	7.68*K (24*CSSFinterRAT)	
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 Section 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 E-UTRAN FDD cells per E-UTRA FDD frequency layer 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_{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)	Tmeasure, E-UTRAN FDD (S) (DRX cycles)	
≤0.08 Non-DRX requirements in Section 9.4.2.2		
0< 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 Section 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 Section 10.2.2.

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in Section 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in Section 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 Sections 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 Sections 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 Section 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 Sections 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 x 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 $_{\text{Identify, E-UTRAN FDD}}$ defined in Sections 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 \leq [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.

9.4.3 SA: NR – E-UTRAN TDD measurements

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 Section 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 Section 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 Section 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,

,

- When configuration 2 or configuration 3 in Table 9.4.3.2-1 is applied,

,

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in Section 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 Section 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{\text{Measure, E-UTRAN TDD}}$ 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	Number of UL/DL sub- frames per half frame (5 ms)		DwPTS		T _{Measure, E-UTRAN} TDD [ms]
	[RB]	DL	UL	Normal CP	Extende d CP	
0	6	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	480 x CSSF _{interRAT}
1 (Note 1)	50	2	2	$19760 \cdot T_{\rm s}$	20480·T _s	240 x CSSF _{interRAT}
NOTE 1: This o	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 E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer 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 Section 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in Section 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in Section 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	
	Section 9.4.3.2 apply	Section 9.4.3.2 apply	
0.256	5.12*K (20*CSSF _{interRAT})	7.68*K (30*CSSF _{interRAT})	
0.32	6.4*K (20*CSSF _{interRAT})	7.68*K (24*CSSF _{interRAT})	
0.32< DRX-cycle ≤10.24	Note1 (20*CSSFinterRAT)	Note1 (20*CSSFinterRAT)	
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is as defined in Section 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 E-UTRAN TDD cells per E-UTRA TDD frequency layer 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_{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 Section 9.4.3.2 apply	
0.128	For configuration 2, non-DRX requirements in	
	section 9.4.3.2 apply,	
	Otherwise: Note1 (5*CSSF _{interRAT})	
0.128 <drx-cycle≤10.24< td=""><td>Note1 (5*CSSF_{interRAT})</td></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 Section 9.4.3.2.		

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 Section 10.2.2.

The NR – E-UTRAN TDD RSRO measurement accuracy for all measured cells shall be as specified in Section 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in Section 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 Sections 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 Sections 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 Section 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 Sections 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 x 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 Sections 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 \leq [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 SA: Inter-RAT RSTD measurements

9.4.4.1 SA: 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].

The requirements in section 9.4.4.1 apply, provided:

- the UE is provided with the LTE timing information [reference TBD], including both *nr-LTE-SFN-Offset* and [*nr-LTE-fineTiming-Offset*], or
- 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 in FR1 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 FDD} time period starts while meeting all the requirements in Section 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 starts,
- when the UE is not aware of the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may request measurement gaps in FR1 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 $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ time period starts while meeting all the requirements in Section 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 $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ 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:

$${\rm T_{RSTD\;InterRAT,\,E-UTRAN\;FDD}} \, = T_{\rm PRS} \, \cdot (M \, -1) + \Delta \qquad ms \; , \label{eq:transform}$$

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 Section 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

occasions.

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 posit	ioning occasions M	
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2	
160 ms	16 × CSSF _{interRAT}	32 × CSSF _{interRAT}	
>160 ms	8 x CSSF _{interRAT}	16 × CSSF _{interRAT}	
	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.		
	2: When inter-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 $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ 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

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 RE during the useful part of the symbol to the average received power spectral density of the total noise and interference for this RE, where the ratio is measured over all REs 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 Section 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 x 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 and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data. 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 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 request measurement gaps 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

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN FDD} + T_{MIB}$$
,

where

T_{Detect, E-UTRAN FDD} = TBD 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 (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), 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).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this section are met, provided the conditions for the detectable cell are fulfilled according to Section 9.4.2.1. In addition, the MIB of an E-UTRA 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. Within the timing acquisition time period, $T_{\text{RefCell,E-UTRAN}}$, when using autonomous gaps the UE shall transmit at least $N_{\text{ACK/NACK, FDD, FR1}}$ ACK/NACKs on PCell in FR1 or each of activated SCell(s) in the same frequency range, specified in Table 9.4.4.1.2.2-1, 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 eachslot,
- [2] slot ACK/NACK feedback is configured.

Table	Configuration of the serving cell in which the transmitted ACK/NACKs are counted		
9.4.4.1.2.2-1: Number of ACK/NACKs transmitted by the UE during TMIBNACK/NACK,	Duplex mode configuration	SCS	SMTC period
FDD, FR1 [TBD]	FDD	15 kHz	10
[TBD]	FDD	15 kHz	20
[TBD]	FDD	15 kHz	40
[TBD]	FDD	30 kHz	10
[TBD]	FDD	30 kHz	20
[TBD]	FDD	30 kHz	40
[TBD]	FDD	60 kHz	10
[TBD]	FDD	60 kHz	20
[TBD]	FDD	60 kHz	40
[TBD]	TDD Note 1	15 kHz	10
[TBD]	TDD Note 1	15 kHz	20
[TBD]	TDD Note 1	15 kHz	40
[TBD]	TDD Note 1	30 kHz	10
[TBD]	TDD Note 1	30 kHz	20
[TBD]	TDD Note 1	30 kHz	40
[TBD]	TDD Note 1	60 kHz	10
[TBD]	TDD Note 1	60 kHz	20
[TBD]	TDD Note 1	60 kHz	40
NOTE 1: TDD	UL-DL configuration is	as specified in Table A.3.3.	1-1 of TS 38.101-1 [18].

Editor' note: the requirement applicability with SRS carrier based switching is TBD.

9.4.4.2 SA: 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].

The requirements in section 9.4.4.1 apply, provided:

- the UE is provided with the LTE timing information [reference TBD], including both *nr-LTE-SFN-Offset* and [*nr-LTE-fineTiming-Offset*], or
- 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 in FR1 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
 - $T_{\text{RSTD InterRAT,E-UTRAN TDD}}$ time period starts while meeting all the requirements in Section 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 the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may request measurement gaps in FR1 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 Section 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.

Editor's note: the requirements applicability is FFS when the UE is provided with *cellGlobalId* [22] for the LTE OTDOA assistance data reference cell.

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=16 cells, including the reference cell, within $T_{RSTD\ InterRAT,E-UTRAN\ TDD}$ ms as given below:

$$T_{RSTD InterRAT, E-UTRAN TDD} = T_{PRS} \cdot (M-1) + \Delta$$
 ms

where

 $T_{RSTD InterRAT, E-UTRAN TDD}$ is the total time for detecting and measuring at least *n* cells,

 $T_{\rm PRS}$ 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 9.4.4.2.2-1, 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 Section 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 M	
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT
>160 ms	8 × CSSF _{interRAT}	16 × CSSF _{interRAT}
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 section 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 a	re 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 Ti	ransmission 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:	Uplink-downlink configurations a	re 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 $T_{\text{RSTD InterRAT.E-UTRANTDD}}$ provided:

 $(PRS \hat{E}_s / Iot)_{ref} \ge -6 dB$ for all Frequency Bands for the reference cell,

 $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i} \ge 13 \text{ dB for all Frequency Bands for neighbour cell } i$,

 $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref}$ 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 Section 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 Section 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 and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data. 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 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 request measurement gaps 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

$$T_{\text{RefCell,E-UTRAN}} = T_{\text{Detect, E-UTRAN TDD}} + T_{\text{MIB}} \; , \label{eq:TrefCell,E-UTRAN}$$

where

 $T_{Detect, E-UTRAN \, FDD} = TBD$ 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 ($T_{Detect, E-UTRAN \, FDD} = 0$ when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provded in the E-UTRA OTDOA assistance data), 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).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this section are met, provided the conditions for the detectable cell are fulfilled according to Section 9.4.3.1. In addition, the MIB of an E-UTRA 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. Within the timing acquisition time period, $T_{\text{RefCell,E-UTRAN}}$, when using autonomous gaps the UE shall transmit at least $N_{\text{ACK/NACK, TDD, FR1}}$ ACK/NACKs on PCell in FR1 or each of activated SCell(s) in the same frequency range, specified in Table 9.4.4.2.2.2-1, 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.

Table 9.4.4.2.2.2-1: Minimum number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack,	Configuration of the serving cell in which the transmitted ACK/NACKs are counted		
TDD, FR1	Duplex mode configuration	SCS	SMTC period
[TBD]	FDD	15 kHz	10
[TBD]	FDD	15 kHz	20
[TBD]	FDD	15 kHz	40
[TBD]	FDD	30 kHz	10
[TBD]	FDD	30 kHz	20
[TBD]	FDD	30 kHz	40
[TBD]	FDD	60 kHz	10
[TBD]	FDD	60 kHz	20
[TBD]	FDD	60 kHz	40
[TBD]	TDD Note 1	15 kHz	10
[TBD]	TDD Note 1	15 kHz	20
[TBD]	TDD Note 1	15 kHz	40
[TBD]	TDD Note 1	30 kHz	10
[TBD]	TDD Note 1	30 kHz	20
[TBD]	TDD Note 1	30 kHz	40
[TBD]	TDD Note 1	60 kHz	10
[TBD]	TDD Note 1	60 kHz	20
[TBD]	TDD Note 1	60 kHz	40
NOTE: TDD	UL-DL configuration is a	as specified in Table A.3.3.1-	-1 of TS 38.101-1 [18].

9.4.5 SA: 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 Section 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].

9.4.5.1.2 Requirements

The requirements in Section 9.4.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in Section 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 Sections 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 Section 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].

9.4.5.2.2 Requirements

The requirements in Section 9.4.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in Section 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 Sections 10.2.2 and 10.2.3, respectively.

9.5 L1-RSRP measurements for Reporting

9.5.1 Introduction

When configured by the PCell or the PSCell, the UE shall be able to measure SSB, CSI-RS or both and perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed 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 CSI Resource set(s) within the CSI Resource settings configured for the active BWP.

Unless the reporting quantity is set to 'none' in a CSI-RS resource, the UE shall report the quantity for the CSI reporting configuration associated by the reporting quantity.

9.5.2 Requirements applicability

The requirements in Section 9.5 apply, provided:

- The CSI-RS or SSB or CSI-RS and SSB resources configured for L1-RSRP measurements measurable.

An CSI-RS and/or SSB resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS and/or SSB:

- L1-RSRP related side conditions given in Sections 10.x.x for a corresponding Band,
- SSB_RP and SSB Es/Iot according to Annex B.2.2 for a corresponding Band.

Requirements are defined for periodic, semi-persistent and aperiodic resources.

9.5.3 Measurement Reporting Requirements

The UE shall only send L1-RSRP reports 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 section 10.1.x if *nrofReportedRS* is configured to one. Otherwise, and additionally if *groupBasedBeamReporting* is enabled the UE shall use differential L1-RSRP based reporting as defined in section 10.1.x.

9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP reports shall meet the requirements in sections 10.x, 10.y and 10.z, respectively.

The UE shall not send any periodic L1-RSRP reports for a non-active BWP.

The L1-RSRP reporting delay is FFS.

The periodic L1-RSRP reporting delay shall be less than [TBD].

9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in Semi-Persistent L1-RSRP reports shall meet the requirements in sections 10.x, 10.y and 10.z, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall not send any semi-persistent L1-RSRP reports on PUSCH, as long as no DCI request have been received.

The UE shall not send any semi-persistent L1-RSRP reports on PUCCH, as long as no activation command [38.321] have been received.

The L1-RSRP reporting delay is defined as the time between a request or command that will trigger an L1-RSRP report is received by the UE and the point when the UE starts to transmit the L1-RSRP report over the air interface.

The Semi-persistent L1-RSRP reporting delay shall be less than [TBD] for a DCI requested semi-persistent L1-RSRP report and less than [TBD] for an L1-RSRP requested by activation command [36.321].

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 sections 10.x, 10.y and 10.z, respectively.

The UE shall not send any aperiodic L1-RSRP reports, as long as no DCI trigger have been received.

The L1-RSRP reporting delay is defined as the time between a DCI request that will trigger an L1-RSRP report and the point when the UE starts to transmit the L1-RSRP report over the air interface.

The aperiodic L1-RSRP reporting delay shall be less than [TBD].

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 $T_{BM\ Measurement\ Period\ SSB}$.

The value of T_{BM_Measurement_Period_SSB} is defined in Table 9.5.4.1-1 for FR1 with M=TBD.

The value of $T_{BM_Measurement_Period_SSB}$ is defined in Table 9.5.4.1-2 for FR2 with M=TBD and N=TBD.

Note: for SSB based L1-RSRP measurement, N=1 does not apply.

For FR1,

- P=1/(1 T_{SSB}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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,

- $P=1/(1-T_{SSB}/T_{SMTCperiod})$, when BM-RS is not overlapped with measurement gap and BM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).

- P is $P_{sharing\ factor}$, when BM-RS is not overlapped with measurement gap and BM-RS is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- P is $1/(1-T_{SSB}/MGRP-T_{SSB}/T_{SMTCperiod})$, when BM-RS is partially overlapped with measurement gap and BM-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
 - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $1/(1-T_{SSB}/MGRP)^*$ $P_{sharing\ factor}$, when BM-RS is partially overlapped with measurement gap and BM-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 $T_{SSB} = 0.5*T_{SMTCperiod}$
- P is $1/\{1-T_{SSB}/min(T_{SMTCperiod},MGRP)\}$, when BM-RS is partially overlapped with measurement gap (T_{SSB} <MGRP) and BM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $1/(1-T_{SSB}/MGRP)^*$ P_{sharing factor}, when BM-RS is partially overlapped with measurement gap and BM-RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 3$.

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.

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

Editor's Note: FFS what evaluation period would be expected if BM-RS are in the same OFDM symbols with RLM/BFD/CBD-RS, or other BM-RS.

Table 9.5.4.1-1: Measurement period T_{BM_Measurement_Period_SSB} for FR1

Con	Configuration T _{BM_Measurement_Period_SSB} (ms)	
n	on-DRX	max(T _{Report} , ceil(M*P)*T _{SSB})
DRX c	ycle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{SSB}))
DRX cycle > 320ms		ceil(M*P)*T _{DRX}
Note: T _{SSB} is the periodicity of SSB 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_{BM_Measurement_Period_SSB} for FR2

Con	figuration	TBM_Measurement_Period_SSB (ms)
non-DRX		max(T _{Report} , ceil(M*P*N)*T _{SSB})
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{SSB}))
DRX c	ycle > 320ms	ceil(1.5*M*P*N)*T _{DRX}
Note:	T _{SSB} is the pe	riodicity of SSB configured for L1-RSRP measurement.
T _{DRX} is the D		RX 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 $T_{BM_Measurement_Period_CSI-RS}$.

The value of T_{BM_Measurement_Period_CSI-RS} is defined in Table 9.5.4.2-1 for FR1 with

- M=TBD for measurement on periodic and semi-persistent CSI-RS resources

- M=1 for aperiodic CSI-RS resources

The value of $T_{BM_Measurement_Period_CSI-RS}$ is defined in Table 9.5.4.2-2 for FR2 with

- M=TBD and N=TBD for measurement on periodic and semi-persistent CSI-RS resources
- M=1 and N=1 for aperiodic CSI-RS resources

For FR1,

- P=1/(1 T_{CSI-RS}/MGRP), when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency 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 BM-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=1/(1-T_{CSI-RS}/MGRP)$, when BM-RS is partially overlapped with measurement gap and BM-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P=1/(1-T_{CSI-RS}/T_{SMTCperiod})$, when BM-RS is not overlapped with measurement gap and BM-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- P is $P_{sharing\ factor}$, when BM-RS is not overlapped with measurement gap and BM-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- P is $1/(1-T_{CSI-RS}/MGRP-T_{CSI-RS}/T_{SMTCperiod})$, when BM-RS is partially overlapped with measurement gap and BM-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 is $1/(1-T_{CSI-RS}/MGRP)^*$ $P_{sharing\ factor}$, when BM-RS is partially overlapped with measurement gap and BM-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 is 1/{1- T_{CSI-RS} /min (T_{SMTCperiod} ,MGRP)}, when BM-RS is partially overlapped with measurement gap (T_{CSI-RS} < MGRP) and BM-RS is partially overlapped with SMTC occasion (T_{CSI-RS} < T_{SMTCperiod}) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $1/(1-T_{CSI-RS}/MGRP)^*$ P_{sharing factor}, when BM-RS is partially overlapped with measurement gap and BM-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} is 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 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 BM-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Editor's Note: FFS what evaluation period would be expected if BM-RS are in the same OFDM symbols with RLM/BFD/CBD-RS, or other BM-RS.

Table 9.5.4.2-1: Measurement period T_{BM_Measurement_Period_CSI-RS} for FR1

Conf	iguration	TBM_Measurement_Period_CSI-RS (ms)
non-DRX		max(T _{Report} , ceil(M*P)*T _{CSI-RS})
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{CSI-RS}))
DRX cycle > 320ms		ceil(M*P)*T _{DRX}
Note 1:	T _{CSI-RS} is the	periodicity of CSI-RS configured for L1-RSRP
Note 2:	periodicity for the requireme	t. T _{DRX} is the DRX cycle length. T _{Report} is configured reporting. ents are applicable provided that the CSI-RS resource r L1-RSRP measurement is transmitted with Density =

Table 9.5.4.2-2: Measurement period T_{BM} Measurement Period CSI-RS for FR2

Conf	iguration	TBM_Measurement_Period_CSI-RS (ms)
non-DRX		max(T _{Report} , ceil(M*P*N)*T _{CSI-RS})
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{CSI-RS}))
DRX cycle > 320ms		ceil(M*P*N)*T _{DRX}
Note 1:	Tcsi-Rs is the	periodicity of CSI-RS configured for L1-RSRP
Note 2:	periodicity for the requireme	t. T _{DRX} is the DRX cycle length. T _{Report} is configured reporting. ents are applicable provided that the CSI-RS resource r L1-RSRP measurement is transmitted with Density =

9.5.5 Measurement restriction for CSI-RS and SSB for L1-RSRP measurement

The UE is required to be capable of measuring CSI-RS for L1-RSRP without measurement gaps. The UE is required to perform the CSI-RS measurements as described in the following clauses.

9.5.5.1 UE performing CSI-RS measurements with a same subcarrier spacing as SSB on FR1

When the SSB is within the active BWP and has same SCS than CSI-RS, the UE shall be able to perform CSI-RS measurement without restrictions when CSI-RS measurement are performed with same subcarrier spacing as the SSB on FR1.

9.5.5.2 CSI-RS measurement restrictions of UE performing CSI-RS measurements with a different subcarrier spacing than SSB on FR1

When the SSB is within the active BWP and has different SCS than CSI-RS, the UE shall be able to performs CSI-RS measurement with restrictions according to its capabilities:

- If CSI-RS and SSB are FDM'ed. the UE measurement capability depends on the whether the UE supports simultaneousRxDataSSB-DiffNumerology.
 - If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to performs CSI-RS measurement without restrictions assuming *useServingCellTimingForSync* is enabled.
 - If the UE does not support *simultaneousRxDataSSB-DiffNumerology* the UE is not expected to perform simultaneous FDM'ed SSB and CSI-RS measurements.
- If CSI-RS and SSB are TDM'ed, the UE shall be able to performs CSI-RS measurement with restrictions: the UE is not expected to measure CSI-RS on symbols on 1 data symbol before each consecutive SSB symbols and 1 data symbol after each consecutive SSB symbols within the SMTC window duration.

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 as RS for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for L1-RSRP measurement.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions apply to all SCells that are aggregated in the same band as the PCell or PSCell. 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.

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 QCLed with active TCI state for PDCCH/PDSCH, and N=1 applies for the RS for L1-RSRP measurement as specified in section 9.4.5.1 if the reference signal is SSB and in section 9.4.5.2 if the reference signal is CSI-RS
 - There are no scheduling restrictions due to L1-RSRP measurement performed based on SSB or CSI-RS with a same SCS as PDSCH/PDCCH.
 - When performing L1-RSRP measurement based on SSB with a different SCS than PDSCH/PDCCH, for UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on SSB symbols to be measured for L1-RSRP measurement.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on RS for L1-RSRP measurement symbols to be measured for L1-RSRP measurement.

When intra-band carrier aggregation is performed, the scheduling restrictions apply to all serving cells on the band due to L1-RSRP measurement performed on FR2 PCell or PSCell in the same band.

Editor's Note: FFS scheduling restrictions for inter-band carrier aggregation will be defined depending on band combination in future.

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 PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving PCell and/or PSCell.

10 Measurement Performance requirements

Editor's note: Accuracy requirement might be an individual top-level chapter to maintain since it is the performance part.

10.1 NR measurements

10.1.1 Introduction

Editor's note: new measurement metrics may be added according to the RAN4 discussion. Absolute/relative accuracy requirement, mapping table of RSRP/RSRQ may be specified in this section. The numerology and BW combinations might be reflected in the accuracy requirement table.

In the requirements of Section 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, Section B.3.2.1 for UE supporting CA in FR1, and Section 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, Section B.3.2.2 for UE configured with CA in FR1, and Section 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, Section 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, Section 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 38.101-1 [18] Clause 7.3 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.
- Other conditions are TBD.

Table 10.1.2.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

Accı	ıracy			Condition				
Normal	Extreme	SSB	lo ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 2	Minimu		n lo	Maximum lo	
		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	-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	±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	ANR_FDD_FR1_A, NR_TDD_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_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 Section 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 38.101-1 [18] Clause 7.3 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.
- Other conditions are TBD.

Table 10.1.2.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

Accı	ıracy			Condit					
Normal	Extreme	SSB	lo Note 1 range						
condition condition		Ês/lot Note 2	NR operating band groups Note 4	Minimum Io		lo	Maximum Io		
		dB		dBm /	SCS _{SSB}				
dB dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
		≥-3 dB	NR_FDD_FR1_A, NR_TDD_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	±3		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	±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 Section 3.5.2.

10.1.2.2 Intra-frequency [CSI-RS RSRP] accuracy requirements

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 38.101-2 [19] Clause 7.3 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.
- Other conditions are TBD.

Table 10.1.3.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

Accu	ıracy				litions		
Normal	Extreme	SSB	lo Note 1 range				
condition condition	Ês/lot	NR operating band groups ^{Note 2}		Minimum Io		Maximum lo	
				dBm /	SCS _{SSB}		
dB	dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_TDD_FR2_A	TBD	TBD	N/A	-70
		TBD	NR_TDD_FR2_B	TBD	TBD	N/A	-70
101	101		NR_TDD_FR2_F	TBD	TBD	N/A	-70
±[6]	±[9]		NR_TDD_FR2_G	TBD	TBD	N/A	-70
		ľ	NR_TDD_FR2_T	TBD	TBD	N/A	-70
		ľ	NR_TDD_FR2_Y	TBD	TBD	N/A	-70
±[8]	±[11]	TBD	TNR_TDD_FR2_A, NR_TDD_FR2_B, NR_TDD_FR2_F, NR_TDD_FR2_G, NR_TDD_FR2_T, NR_TDD_FR2_Y	N/A	N/A	-70	-50

NOTE 2: NR operating band groups in FR2 are as defined in Section 3.5.3.

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.

The accuracy requirements in Table 10.1.3.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- Other conditions are TBD.

Table 10.1.3.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2

Accı	ıracy				ditions		
Normal	Extreme	SSB					
condition		Ês/lot Note 2	NR operating band groups Note 3		Minimum Io		Maximum lo
				dBm /	SCS _{SSB}		
dB	dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_TDD_FR2_A	TBD	TBD	N/A	TBD
			NR_TDD_FR2_B	TBD	TBD	N/A	TBD
⊥ [6]	101] TBD	NR_TDD_FR2_F	TBD	TBD	N/A	TBD
±[6]	±[9]		NR_TDD_FR2_G	TBD	TBD	N/A	TBD
			NR_TDD_FR2_T	TBD	TBD	N/A	TBD
			NR_TDD_FR2_Y	TBD	TBD	N/A	TBD

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: NR operating band groups in FR2 are as defined in Section 3.5.3.

10.1.3.2 Intra-frequency [CSI-RS RSRP] accuracy requirements

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 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.
- Other conditions are TBD.

Table 10.1.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

Accı	ıracy			Condit				
Normal	Extreme	SSB		lo ^{Note 1} range				
condition	condition	Ês/lot Note 2	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	-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	
±4.5	±6	±6 ≥[-6] dB	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_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,	N/A	N/A	-70	-50	

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: NR operating band groups in FR1 are as defined in Section 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 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.

$$\left| RSRP1 \right|_{dBm} - RSRP2 \Big|_{dBm} \le 27dB$$

- | Channel 1_Io -Channel 2_Io | \leq 20 dB
- Other conditions are TBD.

Table 10.1.4.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

Accı	ıracy			Condition				
Normal	Extreme	SSB Ês/lot	lo ^{Note 1} range					
condition			NR operating band groups Note 3	Minimum Io			Maximum lo	
		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	-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 Section 3.5.2.

10.1.4.2 Inter-frequency [CSI-RS RSRP] accuracy requirements

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 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.
- Other conditions are TBD.

Table 10.1.5.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2

Accı	ıracy				ditions			
Normal	Extreme	SSB	lo ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 2		Minimum Io		Maximum Io	
			dBm /	SCS _{SSB}				
dB	dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_TDD_FR2_A	TBD	TBD	N/A	-70	
		TBD	NR_TDD_FR2_B	TBD	TBD	N/A	-70	
1.[0]	101		NR_TDD_FR2_F	TBD	TBD	N/A	-70	
±[6]	±[9]		NR_TDD_FR2_G	TBD	TBD	N/A	-70	
			NR_TDD_FR2_T	TBD	TBD	N/A	-70	
			NR_TDD_FR2_Y	TBD	TBD	N/A	-70	
±[8]	±[11]	TBD	TNR_TDD_FR2_A, NR_TDD_FR2_B, NR_TDD_FR2_F, NR_TDD_FR2_G, NR_TDD_FR2_T, NR_TDD_FR2_Y	N/A	N/A	-70	-50	

NOTE 2: NR operating band groups in FR2 are as defined in Section 3.5.3.

10.1.5.1.2 Relative SS-RSRP Accuracy

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.

$$\left| RSRP1 \right|_{dBm} - RSRP2 \Big|_{dBm} \right| \le 27dB$$

- | Channel 1_Io -Channel 2_Io | \leq 20 dB
- Other conditions are TBD.

Table 10.1.5.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2

Accı	ıracy				ditions			
Normal	Extreme	SSB	Io Note 1 range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 3	Minimum Io Maximum				
				dBm /	SCSSSB			
dB	dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_TDD_FR2_A	TBD	TBD	N/A	TBD	
			NR_TDD_FR2_B	TBD	TBD	N/A	TBD	
⊥ [6]	±ro1	ı TBD	NR_TDD_FR2_F	TBD	TBD	N/A	TBD	
±[6]	±[9]	וסטו	NR_TDD_FR2_G	TBD	TBD	N/A	TBD	
			NR_TDD_FR2_T	TBD	TBD	N/A	TBD	
			NR_TDD_FR2_Y	TBD	TBD	N/A	TBD	

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: NR operating band groups in FR2 are as defined in Section 3.5.3.

10.1.5.2 Inter-frequency [CSI-RS RSRP] accuracy requirements

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 -40dBm with 1dB 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 $0~\mathrm{dBm}$ to -30 dB with $2~\mathrm{dB}$ 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
	Infinity	Infinity	dBm

ote: 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 report mapping

Reported value	Measured quantity value(difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0≥ΔRSRP>-2	dB
DIFFRSRP_1	-2≥ΔRSRP>-4	dB
DIFFRSRP_2	-4≥ΔRSRP>-6	dB
DIFFRSRP_3	-6≥ΔRSRP>-8	dB
DIFFRSRP_4	-8≥ΔRSRP>-10	dB
DIFFRSRP_5	-10≥ΔRSRP>-12	dB
DIFFRSRP_6	-12≥ΔRSRP>-14	dB
DIFFRSRP_7	-14≥ΔRSRP>-16	dB
DIFFRSRP_8	-16≥ΔRSRP>-18	dB
DIFFRSRP_9	-18≥ΔRSRP>-20	dB
DIFFRSRP_10	-20≥ΔRSRP>-22	dB
DIFFRSRP_11	-22≥ΔRSRP>-24	dB
DIFFRSRP_12	-24≥ΔRSRP>-26	dB
DIFFRSRP_13	-26≥ΔRSRP>-28	dB
DIFFRSRP_14	-28≥ΔRSRP>-30	dB
DIFFRSRP_15	-30≥ΔRSRP	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 38.101-1 [18] Clause 7.3 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.
- Other conditions are TBD.

Table 10.1.7.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

Accı	ıracy			Condi					
Normal	Extreme	SSB		lo ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 3 Minimu			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	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
		±4 ≥-3 dB	NR_TDD_FR1_C	-120	-117	N/A	-50		
±2.5	±4		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 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 Section 3.5.2.

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 38.101-2 [19] Clause 7.3 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.
- Other conditions are TBD.

Table 10.1.8.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

Accı	ıracy			Condit	ions			
Normal	Extreme	SSB	Io ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 3	Minimum Io			Maximum Io	
		dB		dBm/	SCS _{SSB}			
dB	dB			SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_TDD_FR2_A	TBD	TBD	N/A	-50	
			NR_TDD_FR2_B	TBD	TBD	N/A	-50	
L[O E]	+[4]	≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50	
±[2.5]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50	
			NR_TDD_FR2_T	TBD	TBD	N/A	-50	
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50	
±[3.5]	±[4]	≥[TBD] dB	Note 2	Note 2	Note 2	Note 2	Note 2	

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 FR2 are as defined in Section 3.5.3.

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 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.
- Other conditions are TBD.

Table 10.1.9.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

Accı	ıracy			Condi				
Normal	Extreme	SSB	lo ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum 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	-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 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 Section 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 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.

$$-\left|RSRP\right|_{dBm} - RSRP2\Big|_{dBm} \le 27dB$$

- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- Other conditions are TBD.

Table 10.1.9.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

Accı	ıracy			Condi				
Normal	Extreme	SSB	lo Note 1 range					
condition condition		Ês/lot Note 2	NR operating band groups Note 4	Minimum Io			Maximum Io	
		dB		dBm /	SCS _{SSB}			
dB dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NRFDD_FR1_A, NRTDD_FR1_A	TBD	TBD	N/A	-50	
			NRFDD_FR1_B	TBD	TBD	N/A	-50	
12	1.4	≥[-3]	NRTDD_FR1_C	TBD	TBD	N/A	-50	
±3	± 4	±4 ZI 01 dB	NRFDD_FR1_E, NRTDD_FR1_E	TBD	TBD	N/A	-50	
			NRFDD_FR1_G	TBD	TBD	N/A	-50	
			NRFDD_FR1_H	TBD	TBD	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: NR operating band groups in FR1 are as defined in Section 3.5.2.

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 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.
- Other conditions are TBD.

Table 10.1.10.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

Accı	ıracy			Condit	ions			
Normal	Extreme	SSB	Io ^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups Note 3	Minimum Io Max			Maximum lo	
		dB		dBm / S	SCS _{SSB}		dBm/BW _{Channel}	
dB	dB		SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}			
				120 kHz	240 kHz			
			NR_TDD_FR2_A	TBD	TBD	N/A	-50	
			NR_TDD_FR2_B	TBD	TBD	N/A	-50	
110.51	+[4]	≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50	
±[2.5]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50	
			NR_TDD_FR2_T	TBD	TBD	N/A	-50	
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50	
±[3.5]	±[4]	≥[TBD] dB	Note 2	Note 2	Note 2	Note 2	Note 2	

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 FR2 are as defined in Section 3.5.3.

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 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.
- $\left| RSRP1 \right|_{dBm} RSRP2 \Big|_{dBm} \right| \le 27dB$
- | Channel 1 Io -Channel 2 Io | \leq 20 dB
- Other conditions are TBD.

Table 10.1.10.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2

Accı	ıracy		Conditions						
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot Note 2	NR operating band groups ^{Note 4}	Minimum Io Maximum Io			Maximum lo		
		dB		dBm/S	SCS _{SSB}				
dB	dB	dB		SCS _{SSB} = S	SCS _{SSB} =	dBm/BW _{Channel}	dBm/BW _{Channel}		
				120 kHz	240 kHz				
			NR_TDD_FR2_A	TBD	TBD	N/A	-50		
			NR_TDD_FR2_B	TBD	TBD	N/A	-50		
_լշյ	⊥[4]	≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50		
±[3]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50		
			NR_TDD_FR2_T	TBD	TBD	N/A	-50		
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50		
±[4]	±[4]	≥[TBD] 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: NR operating band groups in FR2 are as defined in Section 3.5.3.

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 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- Other conditions are TBD.

Table 10.1.12.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

Accı	ıracy			Condi					
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum 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	-121	-118	N/A	-50		
		±4 ≥-3 dB	NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3.0	±4		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 Section 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 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- Other conditions are TBD.

Table 10.1.13.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2

Accı	ıracy			Condit	ions			
Normal	Extreme	SSB	Io Note 1 range					
condition	condition	Ês/lot Note 3	NR operating band groups Note 4	Minimum Io			Maximum Io	
		dB		dBm/	SCS _{SSB}			
dB	dB			SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_TDD_FR2_A	TBD	TBD	N/A	-50	
			NR_TDD_FR2_B	TBD	TBD	N/A	-50	
10.01	+[4]	≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50	
±[3.0]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50	
			NR_TDD_FR2_T	TBD	TBD	N/A	-50	
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50	
±[3.5]	±[4]	≥[TBD] dB	Note 2	Note 2	Note 2	Note 2	Note 2	

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 FR2 are as defined in Section 3.5.3.

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 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.
- Other conditions are TBD.

Table 10.1.14.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

Accı	ıracy			Condi					
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ës/lot Note 3	NR operating band groups ^{Note 4}		Minimum 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	-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	<u>±</u> 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 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 Section 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 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.

$$- \left| RSRP \right|_{dBm} - RSRP2 \Big|_{dBm} \right| \le 27dB$$

- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- Other conditions are TBD.

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 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	-121	-118	N/A	-50
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
		≥[-3] dB	NR_TDD_FR1_C	-120	-117	N/A	-50
[±3.5]	[±4]		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 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 Section 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 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.
- Other conditions are TBD.

Table 10.1.15.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2

Accı	ıracy		Conditions								
Normal	Extreme	SSB		lo ^{Note 1} range							
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		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_TDD_FR2_A	TBD	TBD	N/A	-50				
			NR_TDD_FR2_B	TBD	TBD	N/A	-50				
10.01	+[4]	₄ı ≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50				
±[3.0]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50				
			NR_TDD_FR2_T	TBD	TBD	N/A	-50				
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50				
±[3.5]	±[4]	≥[TBD] 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 FR2 are as defined in Section 3.5.3.

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 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.

$$- \left| RSRP \right|_{dBm} - RSRP2 \Big|_{dBm} \right| \le 27dB$$

- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- Other conditions are TBD.

Table 10.1.15.1.2-1: SS-SINR Inter frequency relative accuracy in FR2

Accı	ıracy		Conditions								
		SSB	lo ^{Note 1} range								
Normal condition	Extreme condition	Ës/lot Note 2, Note 4	NR operating band groups Note 5	Minimum Io Maximur							
		dB		dBm/s	SCS _{SSB}						
dB	dB	dB		SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}				
			NR_TDD_FR2_A	TBD	TBD	N/A	-50				
			NR_TDD_FR2_B	TBD	TBD	N/A	-50				
_L3 E1	⊥[4]	.raı ≥[TBD]	NR_TDD_FR2_F	TBD	TBD	N/A	-50				
±[3.5]	±[4]	dB	NR_TDD_FR2_G	TBD	TBD	N/A	-50				
			NR_TDD_FR2_T	TBD	TBD	N/A	-50				
			NR_TDD_FR2_Y	TBD	TBD	N/A	-50				
±[4]	±[4]	≥[TBD] 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 FR2 are as defined in Section 3.5.3.

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 -29dBm 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 PCMAX,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	$33 \le P_{CMAX,c,f}$	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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant SSB,
- Other conditions are TBD.

Table 10.1.19.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

Accı	ıracy			Condit			
Normal	Extreme	SSB		lo	^{Note 1} range		
condition	condition	Ês/lot	NR operating band groups Note 2	Minimum Io			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	-121	-118	N/A	-70
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70
		≥-3dB	NR_TDD_FR1_C	-120	-117	N/A	-70
TBD	TBD		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
TBD	TBD	TBD	NR_FDD_FR1_A, NR_TDD_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_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 Section 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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant SSB,
- Other conditions are TBD.

Table 10.1.19.1.2-1: SSB based L1-RSRP relative accuracy in FR1

Accı	ıracy			Condit					
Normal	Extreme	SSB	lo Note 1 range						
condition condition		Ês/lot Note 2	NR operating band groups Note 4		Minimum Io				
				dBm /	SCSSSB				
dB di	dB	dB		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_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		
TBD	TBD	TBD ≥-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		
TBD	TBD	TBD	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 SSBs 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 Section 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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant CSI-RS,
- Other conditions are TBD.

Table 10.1.19.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR1

Accı	ıracy	Conditions								
Normal	Extreme	CSI-RS		lo	^{Note 1} range					
condition	condition	Ês/lot	NR operating band groups ^{Note 2}		Minimum I	lo	Maximum lo			
				dBm / S	CScsi-Rs					
dB	dB	dB		SCS _{CSI-RS} = 15 kHz	SCS _{CSI-RS} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	N/A	-70			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70			
		TBD ≥-3dB	NR_TDD_FR1_C	-120	-117	N/A	-70			
TBD	TBD		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			
TBD	TBD	TBD	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50			

NOTE 1: lo is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR1 are as defined in Section 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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant CSI-RS,
- Other conditions are TBD.

Table 10.1.19.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR1

Accı	ıracy			Conditi	ons				
Normal	Extreme	CSI-RS	Io Note 1 range						
condition condition		Ês/lot Note 2	NR operating band groups Note 4		Minimum Io				
		dB		dBm/S	CS _{CSI-RS}				
dB	dB			SCS _{CSI-RS} = 15 kHz	SCS _{CSI-RS} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_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		
TBD	TBD	≥-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		
TBD	TBD	TBD	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 CSI-RS Ês/lot is the minimum SSB Ês/lot of the pair of CSI-RS resources 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 Section 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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant SSB,
- Other conditions are TBD.

Table 10.1.20.1.1-1: SSB based L1-RSRP absolute accuracy in FR2

Accı	ıracy				ditions				
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot	NR operating band groups Note 2	Minimum Io			Maximum lo		
				dBm / S	SCS _{SSB}				
dB	dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
		BD ≥-3dB	NR_TDD_FR2_A	TBD	TBD	N/A	-70		
			NR_TDD_FR2_B	TBD	TBD	N/A	-70		
TDD	TDD		NR_TDD_FR2_F	TBD	TBD	N/A	-70		
TBD	טפו		NR_TDD_FR2_G	TBD	TBD	N/A	-70		
			NR_TDD_FR2_T	TBD	TBD	N/A	-70		
			NR_TDD_FR2_Y	TBD	TBD	N/A	-70		
TBD	TBD	TBD	NR_TDD_FR2_A, NR_TDD_FR2_B, NR_TDD_FR2_F, NR_TDD_FR2_G, NR_TDD_FR2_T, NR_TDD_FR2_Y	N/A	N/A	-70	-50		

To is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR2 are as defined in Section 3.5.3.

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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant SSB,
- Other conditions are TBD.

Table 10.1.20.1.2-1: SSB based L1-RSRP relative accuracy in FR2

Accı	ıracy		Conditions								
Normal	Extreme	SSB	Io Note 1 range								
condition	condition	Ês/lot Note 2	NR operating band groups Note 3			Maximum lo					
				dBm /	SCS _{SSB}						
dB	dB dB	dB		SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}				
			NR_TDD_FR2_A	TBD	TBD	N/A	TBD				
			NR_TDD_FR2_B	TBD	TBD	N/A	TBD				
TBD	TBD	> 24D	NR_TDD_FR2_F	TBD	TBD	N/A	TBD				
I DD I	IBD	TBD ≥-3dB	NR_TDD_FR2_G	TBD	TBD	N/A	TBD				
			NR_TDD_FR2_T	TBD	TBD	N/A	TBD				
			NR_TDD_FR2_Y	TBD	TBD	N/A	TBD				

Io is assumed to have constant EPRE across the bandwidth. NOTE 1:

The parameter SSB Es/lot is the minimum SSB Es/lot of the pair of SSBs to which the requirement applies.

NR operating band groups in FR2 are as defined in Section 3.5.3.

10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant CSI-RS,
- Other conditions are TBD.

Table 10.1.20.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR2

Accı	ıracy				litions		
Normal	Extreme	CSI-RS			lo ^{Note 1} range		
condition condition		Ês/lot	NR operating band groups Note 2		Minimum Io		
				dBm/S	CS _{CSI-RS}		
dB	dB	dB		SCS _{CSI-RS} = 60kHz	SCS _{CSI-RS} = 120kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_TDD_FR2_A	TBD	TBD	N/A	-70
			NR_TDD_FR2_B	TBD	TBD	N/A	-70
TBD	TBD	≥-3dB	NR_TDD_FR2_F	TBD	TBD	N/A	-70
ופט	טפו	≥-3ub	NR_TDD_FR2_G	TBD	TBD	N/A	-70
			NR_TDD_FR2_T	TBD	TBD	N/A	-70
			NR_TDD_FR2_Y	TBD	TBD	N/A	-70
TBD	TBD	TBD	NR_TDD_FR2_A, NR_TDD_FR2_B, NR_TDD_FR2_F, NR_TDD_FR2_G, NR_TDD_FR2_T, NR_TDD_FR2_Y	N/A	N/A	-70	-50
NOTE 1: I	o is assumed	to have cor	nstant EPRE across the	bandwidth.	•		

NOTE 2: NR operating band groups in FR2 are as defined in Section 3.5.3.

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 for L1-RSRP measurements are fulfilled according to Annex B.xx for a corresponding Band for each relevant CSI-RS,
- Other conditions are TBD.

Table 10.1.20.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR2

Accı	ıracy		Conditions								
Normal	Extreme	CSI-RS	CSI-RS lo Note 1 range								
condition	condition	Ês/lot Note 2	NR operating band groups Note 3			Maximum lo					
				dBm/S	CScsi-Rs						
dB	dB	dB		SCS _{CSI-RS} = 60kHz	SCS _{CSI-RS} = 120kHz	dBm/BW _{Channel}	dBm/BW _{Channel}				
		≥-3dB	NR_TDD_FR2_A	TBD	TBD	N/A	TBD				
			> 04D	> 24D	> 24D	> 24D	NR_TDD_FR2_B	TBD	TBD	N/A	TBD
TBD	TBD						> 24D	NR_TDD_FR2_F	TBD	TBD	N/A
ופט	180 180 2-305		NR_TDD_FR2_G	TBD	TBD	N/A	TBD				
			NR_TDD_FR2_T	TBD	TBD	N/A	TBD				
			NR_TDD_FR2_Y	TBD	TBD	N/A	TBD				

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

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: NR operating band groups in FR2 are as defined in Section 3.5.3.

10.2 E-UTRAN measurements

10.2.1 Introduction

Accuracy requirements for E-UTRAN measurements are specified in Section 10.2.

The requirements in this clause are applicable for a UE:

- in RRC_CONNECTED state
- performing measurements with appropriate measurement gaps according to section 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 Section 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 section 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 TS 36.133 [15, Section 9.1.3].

The reporting range and mapping specified for RSRP measurements in TS 36.133 [15, Section 9.1.4] 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 section 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 TS 36.133 [15, Section 9.1.6].

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 TS 36.133 [15, Section 9.1.6].

The reporting range and mapping specified for RSRQ measurements in TS 36.133 [15, Section 9.1.7] shall apply.

10.2.4 E-UTRAN RSTD measurements

The requirements in this section are valid for UE supporting this capability.

The measurement period is specified in Sections 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 TS 36.133 [15, Section 9.1.10.2].

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 Section 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, Sections 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 section 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 TS 36.133 [15, Section 9.1.17.3].

The reporting range and mapping for E-UTRA RS-SINR measurements shall be the same as specified for RS-SINR measurements in TS 36.133 [15, 9.1.17.1].

11 Measurements Performance Requirements for NR network

Editor's note: network side measurement and mapping tables may be specified in this section. If RAN4 decides to move NR network requirements to gNodeB specification, this section might be removed.

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].

A.2.1.2 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. \pm -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 σ 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.

A.2.1.3 Implementation requirements

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)

A.2.1.4 Physical layer timing requirements

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 section A.3.10.

A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for SCS=15kHz

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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	slots	[4]		
SSB				
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 section 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	slots	[10]				
SSB						
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 section 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	slots	[48]				
SSB						
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 section 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 RMSI CORESET	KHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
Subcarrier spacing for SSB	KHz	15	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbol s	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

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	
Index of transmited SSB within an SS-Burst		#0	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbol s	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

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				
Index of transmited SSB within an SS-Burst		#0				
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1				
Offset between SSB and RMSI CORESET Note 3, 7	RB	0				
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4				
Number of transmitter antennas		1				
Duration of RMSI CORESET Note 7	symbol s	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

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	
Subcarrier spacing for SSB	KHz	120	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbol s	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	1
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

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	symbol s	2			
REG bundle size		6			
DMRS precoder granularity		Same as REG bundle size			
CCE to REG mapping		Interleave d			
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

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

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	symbol	2				
	S					
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleave d				
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

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

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	symbol	2	
	S		
REG bundle size		6	
DMRS precoder granularity		Same as REG bundle size	
CCE to REG mapping		Interleave d	
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

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

Table A.3.1.3.2-3: Control Channel RMC for TDD with SCS=120KHz

Parameter	Unit			Value		
Reference channel		[CCR.3.1] TDD				
Channel bandwidth	MHz	100				
Subcarrier spacing	KHz	120				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbol	2				
	S					
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleave d				
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

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

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='9DL:3GP:2UL'		
dl-UL-TransmissionPeriodicity	ms	4		
nrofDownlinkSlots		1		
nrofDownlinkSymbols		9		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dl-UL-TransmissionPeriodicity	ms	1		
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='4DL:6GP:4UL'	
dl-UL-TransmissionPeriodicity	ms	4	
nrofDownlinkSlots		3	
nrofDownlinkSymbols		4	
nrofUplinkSlot		4	
nrofUplinkSymbols		4	
TDD UL/DL pattern 2 Note 2		'DD'	
dl-UL-TransmissionPeriodicity	ms	1	
nrofDownlinkSlots		2	
nrofDownlinkSymbols		0	
nrofUplinkSlot		0	
nrofUplinkSymbols		0	

Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

A.3.2 OFDMA channel noise generator (OCNG)

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	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.					

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: The DRX cycle and time alignment 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: 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: The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS		
38.331 [2]		

A.3.4 Duplex mode

A.3.5 Test cases with different numerologies

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 section A.4 and A.6 are specified for UEs supporting 2RX. In this section, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in section 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 section 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 section 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 sections A.4 and A.6 shall be tested using the antenna connection specified in section 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			
				•			

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 dur	ing T3 (dB)	SNR during T4 (dB)	
	Test 1	Test 2	Test 1	Test 2

A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in section 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 section 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 section 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 section 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 remaning 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 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 theresholds described in sections A.3.8.1.2.1 and A.3.8.1.2.2, 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 remaning 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 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 theresholds described in sections A.3.8.1.2.1 and A.3.8.1.2.2, no test parameters or requirements are modified.

A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, Downlink Antenna Configuration 2x2 for NR RRM FR2 requirements implies the following for the test configuration:

- The downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.
- 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 with all NR cells in FR1.

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 special subframe configuration Note1		1
BWchannel		5MHz: N _{RB,c} = 25
DVV channel		10MHz: N _{RB,c} = 25
		20MHz: N _{RB,c} = 30
PDSCH parameters:		5MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10MHz: R.3 FDD
DE Reference Measurement Orialmei		20MHz: R.6 FDD
		5MHz: R.4 TDD
		10MHz: R.0 TDD
		20MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10MHz: R.6 FDD
DE Reference Meacarement Charmer		20MHz: R.10 FDD
		5MHz: R.11 TDD
		10MHz: R.6 TDD
		20MHz: R.10 TDD
OCNG Patterns ^{Note2}		5MHz: OP.20 FDD
		10MHz: OP.10 FDD
		20MHz: OP.17 FDD
		5MHz: OP.9 TDD
		10MHz: OP.1 TDD
		20MHz: 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
Ês/Noc	dB	17
Ê _s /I _{ot}	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
lo Note5	dBm/Ch BW	-59.13
	GDIII, OII DVV	+10log
		(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration	1	1x2
	nlink configuration	s are specified in table 4.2-1 in TS 36.211.

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 sections 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 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.

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 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	5MHz: N _{RB,c} = 25
- · · Citalinei		10MHz: N _{RB,c} = 50
		20MHz: N _{RB,c} = 100
PDSCH parameters:		5MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10MHz: R.3 FDD
		20MHz: R.6 FDD
		5MHz: R.4 TDD
		10MHz: R.0 TDD
		20MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10MHz: R.6 FDD
		20MHz: R.10 FDD
		5MHz: R.11 TDD
		10MHz: R.6 TDD
		20MHz: R.10 TDD
OCNG Patterns ^{Note2}		5MHz: OP.20 FDD
		10MHz: OP.10 FDD
		20MHz: OP.17 FDD
		5MHz: OP.9 TDD
		10MHz: OP.1 TDD
		20MHz: 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	
		-

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 sections 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.3.8 PRACH configurations

A.3.8.1 Introduction

This section provides the typical PRACH configurations used for RRM test cases defined in Annex A. To note that for other parameters not listed in this section, 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 section 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	87	160ms 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 acces
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic equence 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	-106dBm≤ rsrp-ThresholdSSB <-105dBm
ra-ContentionResolutionTimer	sf48	48 sub-frames
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission perfomed 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 s	ee Clause 6.3.2 in 1	TS 38.331 [2].

A.3.8.2.2 FR1 PRACH configuration 2

FR1 PRACH configuration 2 in this section provides the typical PRACH configuration for SSB based non-contention based random access in FR1.

Table A.3.8.2.2-1: Parameters for FR1 PRACH configuration 2

Field	Value	Comment	
prach-ConfigurationIndex	87	160ms 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 acces	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic equence 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 perfomed 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].	
ssb-ResourceList	ra-PreambleIndex = 50	Assocated with SSB index 0	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
Note: For further information se	ee Clause 6.3.2 in TS 38.331 [2	2].	

A.3.8.2.3 FR1 PRACH configuration 3

FR1 PRACH configuration 3 in this section provides the typical PRACH configuration for CSI-RS based noncontention based random access in FR1.

Table A.3.8.2.3-1: Parameters for FR1 PRACH configuration 3

Field	Value	Comment	
prach-ConfigurationIndex	87	160ms 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 acces	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic equence 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 perfored 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].	
csirs-ResourceList	ra-PreambleIndex = 50	Assocated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
Note: For further information se	ee Clause 6.3.2 in TS 38.331 [2	2].	

A.3.8.2.4 FR1 PRACH configuration 4

FR1 PRACH configuration 4 in this section provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR1.

Table A.3.8.2.4-1: Parameters for FR1 PRACH configuration 4

Field	Value	Comment	
prach-ConfigurationIndex	0	160ms 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 acces	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic equence 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 perfored 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].	
csirs-ResourceList	ra-PreambleIndex = 50	Assocated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
Note: For further information se	ee Clause 6.3.2 in TS 38.331 [2	2].	

A.3.8.3 PRACH configurations in FR2

A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this section 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	173	Preamble Format C2, with 160ms 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 equence 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	-106dBm≤ rsrp-ThresholdSSB<-105dBm	
ra-ContentionResolutionTimer	sf48	48 sub-frames	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission perfomed 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.3.8.3.2 FR2 PRACH configuration 2

FR2 PRACH configuration 2 in this section provides the typical PRACH configuration for SSB based non-contention based random access in FR2.

Table A.3.8.3.2-1: Parameters for FR2 PRACH configuration 2

Field	Value	Comment	
prach-ConfigurationIndex	173	Preamble Format C2, with 160ms 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 equence index = 0, resulting in roo 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 perfomed 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].	
ssb-ResourceList	ra-PreambleIndex = 50	Assocated with SSB index 0	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
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 section provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Field	Value	Comment	
prach-ConfigurationIndex	173	Preamble Format C2, with 160ms 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 equence 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 perfomed 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].	
csirs-ResourceList	ra-PreambleIndex = 50	Assocated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
Note: For further information see Clause 6.3.2 in TS 38.331 [2].			

A.3.8.3.4 FR2 PRACH configuration 4

FR2 PRACH configuration 4 in this section provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Field	Value	Comment	
prach-ConfigurationIndex	144	Preamble Format C0, with 160ms 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 equence 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 perfored before declaring a failure is 200.	
ra-ResponseWindow	sl40	40 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].	
csirs-ResourceList	ra-PreambleIndex = 50	Assocated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	-106dBm≤ rsrp-ThresholdSSB <-105dBm	
Note: For further information see Clause 6.3.2 in TS 38.331 [2].			

A.3.9 BWP configurations

A.3.9.1 Introduction

This section 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 section A.3.9.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in section A.3.9.3. To note that for other parameters not listed in this section, 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 CORSET(CORSE T #0) defined in each test	
Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RB., RB., 11, RB., 119) which is defined in Section 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	s Unit		Values	
Reference BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3
Starting PRB index	х	0	RB _b Note 1	RBa 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
Note 1: RB _b is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RB _J , RB _{J+1} ,, RB _{J+19}) which is defined in Section A.3.10.				
Note 2: RB _a is the lowest PRB index to guarantee the BWP including SSB PRB index (RB _J , RB _{J+1} ,, RB _{J+19}) which is defined in Section 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	RBa Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORSET(CORSET #0) defined in each test	
Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RBJ, RBJ+1,, RBJ+19) which is defined in Section 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	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: RB _b is the lowest PRB index to guarantee the BWP not fully overlapped with SSB				
PRB index (RB _J , RB _{J+1} ,, RB _{J+19}) which is defined in Section A.3.10.				
Note 2: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RBJ, RBJ+1,, RBJ+19) which is defined in Section 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 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	20 ms		
Number of SSBs per SS-burst	1		
SS/PBCH block index	0		
Indices of symbols containing SSB	2-5		
Indices of slots containing SSB	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].			

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	30 KHz	
SSB periodicity	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Indices of symbols containing SSB	4-7	
Indices of of slots containing SSB	0	
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)Note		
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		

A.3.10.1.3 SSB pattern 1 in FR1: SSB 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		Values
Channel bandwidth	10 MHz	
SSB SCS	15 KHz	
SSB periodicity	20 ms	
Number of SSBs per SS-burst	2	
SS/PBCH block index	0	1
Symbol numbers of symbols containing SSB	2-5	8-11
RB numbers containing SSB within channel BW	0-19	

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		Values
Channel bandwidth	40 MHz	
SSB SCS	30 KHz	
SSB periodicity 20 ms		
Number of SSBs per SS-burst	2	
SS/PBCH block index	0	1
Symbol numbers of symbols containing SSB	2-5	8-11
RB numbers containing SSB within channel BW	0-19	

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	20 ms	20 ms	
Number of SSBs per SS-burst	2		
SS/PBCH block index	0	1	
Indices of symbols containing SSBs	4-7	8-11	
Indices of slots containing SSB	0	0	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19)Note			
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].			

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	th 100 MHz	
SSB SCS	240 KHz	
SSB periodicity	20 ms	
Number of SSBs per SS-burst	2	
SS/PBCH block index	0	1
Indices of symbols containing SSBs	8-11	12-13, 0-1
Indices of slots containing SSB	0	0, 1
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19)Note		
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].		

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

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	120 KHz	
SSB periodicity	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Indices of symbols containing SSBs	4-7	
Indices of slots containing SSB 0		
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19)		
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].		

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	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Indices of symbols containing SSBs 8-11		
Indices of slots containing SSB 0		
RB numbers containing SSBs 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].		

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.3.12 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 Standalone and Non-Standalone 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.

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

Paramete	er	Unit	Jnit value			
Reference channel			CSI-RS.1.1	CSI-RS.1.2	CSI-RS.1.3	
Reference	e channel		FDD	FDD	FDD	
Bandwidth	า	MHz	10	10 10		
SCS			15	15	15	
	resourceType		periodic	periodic	periodic	
	Number of ports		2	1	1	
	CDM Type		FD-CDM2	noCDM	noCDM	
NZP	Density		1	3	3	
	firstOFDMSymbolInTimeDomain		5	5	5	
CSI-RS	frequencyDomainAllocation		000001	000001	000001	
	period	slot	TBD	TBD	TBD	
	offset	slot	TBD	TBD	TBD	
	EPRE ratio to SSS	dB	0	0	0	
	subcarrierLocation-p0		s0			
CSI-IM	symbolLocation-p0		6	N/A	N/A	
CSI-IIVI	period	slot	TBD		IN/A	
	offset	slot	TBD			
ReportCo	nfigType		periodic	Periodic	Periodic	
CQI-table			Table 1	N/A	N/A	
reportQua			TBD	cri-RSRP	cri-RSRP	
timeRestr	ictionForInterferenceMeasurements		configured			
cqi-Forma	atIndicator		Wideband			
pmi-Form	atIndicator		Wideband			
			Type1			
Codebook	кТуре		single	N/A	N/A	
			panel			
CodebookMode			1			
Typel-SinglePanel-2Tx-			111111			
CodebookSubsetRestriction						
	channel for CSI report		PUCCH	PUCCH	PUCCH	
Reporting		ms	10	TBD	TBD	
CQI/RI/PI	∕II delay	ms	TBD	N/A	N/A	

A.3.14.2 TDD

Table A.3.14.2-1: CSI-RS Reference Measurement Channels for SCS=15kHz

Paramete	er	Unit	value				
Reference channel			CSI-RS.1.1	CSI-RS.1.2	CSI-RS.1.3		
Reference channel			TDD	TDD	TDD		
Bandwidth	า	MHz	10				
SCS		kHz	15	15	15		
	resourceType		periodic	periodic	periodic		
	Number of ports		2	1	1		
	CDM Type		FD-CDM2	noCDM	noCDM		
NZP	Density		1	3	3		
CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5		
CSI-RS	frequencyDomainAllocation		000001	000001	000001		
	period	slot	TBD	TBD	TBD		
	offset	slot	TBD	TBD	TBD		
	EPRE ratio to SSS	dB	0	0	0		
	subcarrierLocation-p0		s0		N/A		
CSI-IM	symbolLocation-p0		6	N/A			
CSI-IIVI	period	slot	TBD				
	offset	slot	TBD				
ReportCo	nfigType		periodic	Periodic	Periodic		
CQI-table			Table 1	N/A	N/A		
reportQua			TBD	cri-RSRP	cri-RSRP		
timeRestr	ictionForInterferenceMeasurements		configured				
cqi-Forma	atIndicator		Wideband				
pmi-Form	atIndicator		Wideband				
			Type1				
Codebook	Туре		single	N/A	N/A		
			panel				
CodebookMode			1				
TypeI-SinglePanel-2Tx-			111111				
CodebookSubsetRestriction							
	channel for CSI report		PUCCH	PUCCH	PUCCH		
Reporting		ms	10	TBD	TBD		
CQI/RI/PI	MI delay	ms	TBD	N/A	N/A		

Table A.3.14.2-2: CSI-RS Reference Measurement Channels for SCS=30kHz

Paramete	er	Unit	value				
Reference channel			CSI-RS.2.1	CSI-RS.2.2	CSI-RS.2.3		
			TDD	TDD	TDD		
Bandwidth	า	MHz	40				
SCS		kHz	30	30	30		
	resourceType		periodic	periodic	periodic		
	Number of ports		2	1	1		
	CDM Type		FD-CDM2	noCDM	noCDM		
NZP	Density		1	3	3		
CSI-RS	firstOFDMSymbolInTimeDomain		5	5	5		
COI-ICO	frequencyDomainAllocation		000001	000001	000001		
	period	slot	TBD	TBD	TBD		
	offset	slot	TBD	TBD	TBD		
	EPRE ratio to SSS	dB	0	0	0		
	subcarrierLocation-p0		s0		N/A		
CSI-IM	symbolLocation-p0		6	N/A			
CSI-IIVI	period	slot	TBD				
	offset	slot	TBD				
ReportCo	nfigType		periodic	Periodic	Periodic		
CQI-table			Table 1	N/A	N/A		
reportQua			TBD	cri-RSRP	cri-RSRP		
timeRestr	ictionForInterferenceMeasurements		configured				
cqi-Forma	atIndicator		Wideband				
pmi-Form	atIndicator		Wideband				
			Type1				
Codebook	Туре		single	N/A	N/A		
			panel				
CodebookMode			1				
TypeI-SinglePanel-2Tx-			111111				
CodebookSubsetRestriction							
	channel for CSI report		PUCCH	PUCCH	PUCCH		
Reporting		ms	10	TBD	TBD		
CQI/RI/PI	MI delay	ms	TBD	N/A	N/A		

Table A.3.14.2-3: CSI-RS Reference Measurement Channels for SCS=120kHz

Paramete	er Unit value					
Reference channel			CSI-RS.3.1	CSI-RS.3.2	CSI-RS.3.3	
			TDD	TDD	TDD	
Bandwidth	า	MHz	100	100 100		
SCS		kHz	120	120	120	
	resourceType		periodic	periodic	periodic	
	Number of ports		2	1	1	
	CDM Type		FD-CDM2	noCDM	noCDM	
NZP	Density		1	3	3	
	firstOFDMSymbolInTimeDomain		5	5	5	
CSI-RS	frequencyDomainAllocation		000001	000001	000001	
	period	slot	TBD	TBD	TBD	
	offset	slot	TBD	TBD	TBD	
	EPRE ratio to SSS	dB	0	0	0	
	subcarrierLocation-p0		s0			
CSI-IM	symbolLocation-p0		6	N/A	N/A	
CSI-IIVI	period	slot	TBD	IN/A		
	offset	slot	TBD			
ReportCo	nfigType		periodic	Periodic	Periodic	
CQI-table			Table 1	N/A	N/A	
reportQua			TBD	cri-RSRP	cri-RSRP	
timeRestr	ictionForInterferenceMeasurements		configured			
cqi-Forma	tIndicator		Wideband			
pmi-Form	atIndicator		Wideband			
			Type1			
Codebook	Туре		single	N/A	N/A	
			panel			
CodebookMode			1			
Typel-SinglePanel-2Tx-			111111			
CodebookSubsetRestriction						
	channel for CSI report		PUCCH	PUCCH	PUCCH	
Reporting		ms	10	TBD	TBD	
CQI/RI/PI	MI delay	ms	TBD	N/A	N/A	

A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases in section A.5 and A.7. The applicable AoA setup is defined in each test case in section A.5 and A.7.

A.3.15.1 Setup 1: Single AoA in Rx beam peak direction

There is only one 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 38.101-2 [19]).

A.4 EN-DC tests with PSCell 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 section 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, 10MHz bandwidth, FDD duplex mode				
2		LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
3		LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
4		LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note: The	Note: The UE is only required 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

	Parame	ter	Unit	Test-1	Comments
SSB Configu	ration	Config 1,2		SSB pattern 1 in FR1	As defined in A.3.10,
		Config 3,4		SSB pattern 2 in FR1	except for number of
				·	SSBs per SS-burst and
					SS/PBCH block index as
					below
Number of S	SBs per SS	-burst		2	Different from the
					definition in A.3.10
SS/PBCH blo	ck index			0,1	Different from the
		10 0 10			definition in A.3.10
Duplex Mode	for Cell 2	Config 1,2		FDD	
		Config 3,4		TDD	
TDD Configu		Config 3,4		TDDConf.1.2	
OCNG Patter		T =		OCNG pattern 1	As defined in A.3.2.1.
PDSCH para	meters	Config 1,2		SR1.1 FDD	As defined in A.3.1.1.
Note 4		Config 3,4		SR2.1 TDD	
NR RF Chan	nel Number	ſ		1	
EPRE ratio of	f PSS to SS	SS	dB		
EPRE ratio o	f PBCH_DN	MRS to SSS	dB		
EPRE ratio of	f PBCH to F	PBCH_DMRS	dB		
EPRE ratio o	f PDCCH_[DMRS to SSS	dB	0	
EPRE ratio o	f PDCCH to	PDCCH_DMRS	dB		
EPRE ratio o	f PDSCH_E	DMRS to SSS	dB		
EPRE ratio o	f PDSCH to	PDSCH_DMRS	dB		
SSB with	\hat{E}_s/I_{ot}		dB	3	SSB with index 0 is
index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	signalled to be above configured rsrp-
	oc	Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	
		•	dB	-17	SSB with index 1 is
SSB with	\hat{E}_s/I_{ot}	-			signalled to be below
index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	configured rsrp-
		Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}	•	dB	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	
. Nete 0	1	Config 1,2	dBm	-65.3/9.36MHz	For symbols without SSB
lo Note 2		Config 3,4		-62.2/38.16MHz	index 1
ss-PBCH-Blo	ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured U	E transmitte	ed power (dBm	23	As defined in clause
$P_{ m CMAX, f,c}$)				6.2.4 in TS 38.101-1.	
PRACH Conf	iguration			FR1 PRACH configuration 1	As defined in A.3.8.2.
Propagation (AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral				mitted nower spectral	

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: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.1.2.4 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.4.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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.4.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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.4.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Subclause 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 section 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, 10MHz bandwidth, FDD duplex mode
2	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is	only required to be tested in one of the supported test configurations depending on UE capability

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

	Parame	ter	Unit	Test-1	Test-2	Comments
SSB Configu		Config 1,2		SSB pattern 1 in	SSB pattern 1 in	As defined in
		_		FR1	FR1	A.3.10, except for
		Config 3,4		SSB pattern 2 in	SSB pattern 2 in	number of SSBs per
				FR1	FR1	SS-burst and
						SS/PBCH block
		<u> </u>				index as below
Number of St	SBs per SS	-burst		2	2	Different from the
00/0001111				0.4	0.4	definition in A.3.10
SS/PBCH blo	ck index			0,1	0,1	Different from the definition in A.3.10
CSI-RS Conf	iguration	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
CSI-KS COIII	iguration	Config 3,4	1	IN/A	CSI-RS.2.1 TDD	As defined in A.3.1.4
Duplex Mode	for Call 2	Config 1,2		FDD	FDD	A.S.1.4
Duplex Mode	ioi Celi Z	Config 3,4	-	TDD	TDD	+
TDD Configu	ration	Config 3,4		TDDConf.1.2	TDDConf.1.2	
OCNG Patter	Note 1	Coning 3,4		OCNG pattern 1	OCNG pattern 1	As defined in
				•	·	A.3.2.1.
PDSCH para	meters	Config 1,2		SR1.1 FDD	SR1.1 FDD	As defined in
Note 4		Config 3,4		SR2.1 TDD	SR2.1 TDD	A.3.1.1.
NR RF Chan				1	1	
EPRE ratio of			dB			
EPRE ratio o			dB			
		PBCH_DMRS	dB			
		DMRS to SSS	dB	0	0	
		PDCCH_DMRS	dB			
		DMRS to SSS	dB			
EPRE ratio of		PDSCH_DMRS	dB		_	
SSB with	\hat{E}_s/I_{ot}		dB	3	3	SSB with index 0 is signalled to be
index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	above configured
	oc	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	1
	SS-RSR	P Note 3	dBm/ SCS	-95	-95	-
	\hat{E}_s/I_{ot}		dB dB	-17	-17	SSB with index 1 is
SSB with index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	signalled to be below configured
	1 oc	Config 3,4	1	-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}	1	dB	-17	-17	-
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	-
	1 00 11011	Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
lo Note 2		Config 3,4	1	-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
	Corning 5,4		dBm/ SCS	-5	-5	As defined in clause
ss-PBCH-BlockPower		dBill/ 3C3	-5	-5	6.3.2 in TS 38.331 [2].	
Configured UE transmitted power (dBm	23	23	As defined in clause	
$P_{ m CMAX, f,c}$)			-		6.2.4 in TS 38.101- 1.	
PRACH Conf	iguration			FR1 PRACH	FR1 PRACH	As defined in
				configuration 2	configuration 3	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: lo level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 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 Subclause 7.1.2.

A.4.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 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 Subclause 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.

Table A.4.4.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz			
2	TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz			
3	TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

For this test a single NR cell is used. 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	Freq1	Freq1	
Duplex Mode		1	F	DD	
Duplex Mode		2,3	,3 TDD		
		1`	Not App	olicable	
TDD configuration		2	TDDC	onf.1.1	
		3	TDDC	onf.1.2	
		1	10: NR	3,c = 52	
BW _{channel}	MHz	2	10: N _{RB,c} = 52		
		3	40: N _{RB,c} = 106		
		1	10: NRB,c = 52		
BWP BW	MHz	2	10: N _{RB,c} = 52		
		3	40: N _{RB,c} = 106		
DRx Cycle	ms	1,2,3	N/A	320 ^{Note5}	
PDSCH Reference		1	SR.1.	1 FDD	
measurement channel		2	SR.1.	1 TDD	
mode and more charmer		3	SR.2.1 TDD		
CORESET Reference		1	CR.1.	1 FDD	
Channel		2	CR.1.	1 TDD]

		3	CR 2	1 TDD	
OCNG Patterns		1,2,3		pattern 1	
		1,2		attern 1	
SMTC configuration		3	FR1 pa	attern 2	1
PDSCH/PDCCH	kHz	1,2	15		
subcarrier spacing		3	3	80	
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	1,23	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)					
$N_{oc}^{ m Note2}$	dBm/15 kHz	1,2,3	-98	-98	
$N_{oc}^{ m Note2}$	dBm/SCS	1,2	-98	-98	
00	ubili/303	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}	dBm/SCS	1,2 3	-95 -92	-95 -92	
Io ^{Note3}	dBm/9.36MHz	1,2	-65.2	-65.2	
	dBm/38.1MHz	3	-59.2	-59.2	1
Propagation condition		1,2,3	AWGN		
SRS Config		1,2,3	Config1 ^{Note6}	Config2 ^{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.4.4.1.1.1-4

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	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	

sequenceld	0	0	Any 10 bit number
periodicityAndOffset-p	sl1	sl640	Offset to align with DRx periodicity
resourceType			0" 11 11 55
	Periodic	Periodic	
groupOrSequenceHopping	Neither	Neither	
b-hop			
freqHopping	0	0	
b-SRS			
freqHopping	0	0	
c-SRS			
freqHopping	sl1	sl1	
freqDomainShift	0	0	
freqDomainPosition	0	0	
repetitionFactor			
resourceMapping	n1	n1	
nrofSymbols			
resourceMapping	n1	n1	

Table A.4.4.1.1.1-4: DRX-Configuration for UL Timing Tests

Field	Test 2
rieid	Value
drx-onDurationTimer	TBD
drx-InactivityTimer	TBD
drx-RetransmissionTimerDL	TBD
drx-RetransmissionTimerUL	TBD
longDRX-CycleStartOffset	TBD
shortDRX	TBD

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 ($N_{TA} + N_{TA \text{ offset}}$) $\pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600 for FR1 and 13792 for FR2
 - 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.4.4.1.1.2-1

Table A.4.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustn	Adjustment Value		
	Test1	Test2		
15	+64*64T _c	+32*64T _c		
30	+32*64T _c	+16*64T _c		
120	+16*64T _c	+8*64T _c		
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 Section 7.1.2 Table 7.1.2-3. This will only be done for Test1.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \pm T_e$ of the first detected path of DL SSB. For Test 2 and Test 4 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 section 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 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

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 30 kHz 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 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
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
DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.1-1
UL BWP		ULBWP.1.1	As specified in Table A.3.9.2.2-1
TRS		TBD	TBD
Timing Advance Command		31	$N_{TA_new} = N_{TA_old}$ for the purpose of
(T _A) value during T1			establishing a reference value from
			which the timing advance adjustment
			accuracy can be measured during T2
Timing Advance Command		39	$N_{TA_new} = N_{TA_old} + 8192 *T_c$ (based on
(T _A) value during T2			equation in TS 38.213 [3] section 4.2)
T1	S	5	
T2	S	5	

Table A.4.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	l Init	Tes	st1
Parameter	Unit	T1	T2

Division	1 -	Config 1,4		FDD
Duplex mo	ode	Config 2,3,5,6		TDD
		Config 1,4		Not Applicable
TDD config	TDD configuration	Config 2,5		TDDConf.1.1
	0	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	<u> </u>	e coming c,c	ms	Not Applicable
•		Config 1,4	1110	SR.1.1 FDD
PDSCH R		Config 2,5		SR.1.1 TDD
measurem	ent channel	Config 3,6		SR2.1 TDD
		Config 1,4		CR.1.1 FDD
CORESET	Γ Reference	Config 2,5		CR.1.1 TDD
Channel		Config 3,6		CR2.1 TDD
OCNG Pa	ttarns	Corning 5,0		OCNG pattern 1
		Config 1,2,4,5		SMTC.1 FR1
SMTC con	nfiguration	Config 3,6		SMTC.2 FR1
PDSCH/PI	DCCH	Config 1,2,4,5		15 kHz
subcarrier		Config 3,6	kHz	30 kHz
PUCCH/P		Config 1,2,4,5		15 kHz
		Config 3,6	kHz	30 kHz
subcarrier spacing Config 3,6 EPRE ratio of PSS to SSS			30 KHZ	
	o of PBCH DM			
	o of PBCH to F			
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS		dB	0	
	o of PDSCH to			
		MRS to SSS(Note 1)		
		OCNG DMRS (Note		
1)	0 01 00110 10	OOIVI) ONING ONOO		
			dBm/15kH	
$N_{\it oc}^{\rm Note2}$			Z	-98
Note2	Config 1,2,4	,5	_	-98
$N_{\it oc}^{\rm Note2}$	Config 3,6	,	dBm/SCS	-95
\hat{E}_s/I_{ot}	· •		dB	3
\hat{E}_{s}/N_{oc}			dB	3
Io ^{Note3}	Config 1,2,4	,5	dBm/ 9.36MHz	-67.57
10 Notes	Config 3,6		dBm/ 38.16MHz	-62.58
Propagation	on 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.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Fie	eld	Value	Comment
c-SRS	Config 1,2,4,5	12	
C-SNS	Config 3,6	24	Fraguency hopping is disabled
b-S	RS	0	Frequency hopping is disabled
b-h	юр	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDom	nainShift	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		nonCodebook	Non-codebook based UL transmission
startPo	osition	0	resourceMapping setting. SRS on last
nrofSy	mbols	n1	symbol of slot, and 1symbols for SRS
repetitio	nFactor	n1	without repetition.
combO	ffset-n2	0	transmissionComb sotting
cyclicShift-n2		0	transmissionComb setting
nrofSRS-Ports		port1	Number of antenna ports used for SRS transmission
Note: For further	er information see cla	use 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 slots after the reception of the timing advance command, where:

k = 4 for Config 1, 2, 4, 5, and

k = 7 for Config 3, 6

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 section, 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 [TBD]) means uplink signal
- UE output power equal to or less than Transmit OFF power [-50] dBm (as defined in TS 38.101-3 [TBD]) 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.

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 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. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.4.5.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	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 30 KHz 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 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Va	ue	
			Test 1	Test 2	
Active E-UTRA PCell			Cell 1	Cell 1	
E-UTRA RF Channel Number			1	1	
Active PSCe	II		Cell 2	Cell 2	
RF Channel	Number		2	2	
Duplex mode			FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD	Config 1, 4		Not Applicable	Not Applicable	
Configuration			[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3, 6		[TDDConf.1.2]	[TDDConf.1.2]	
CORESET	Config 1, 4	<u> </u>	[CR. 1.1 FDD]	[CR. 1.1 FDD]	
Reference	Config 2, 5		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channel	Config 3, 6		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1, 4	}	Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1	
Configuration		<u> </u>	Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1	
SMTC	Config 3, 6		Table A.3.2.2.1.2-1 Table A.3.2.3.1-1	Table A.3.2.2.1.2-1 Table A.3.2.3.1-1	
Configuration					
	Config 3, 6		Table A.3.2.3.1-1	Table A.3.2.3.1-1	
PDSCH/PD0 H subcarrier	5		15 KHz	15 KHz	
spacing	Config 3, 6		30 KHz	30 KHz	
PRACH Configuration			TBD	TBD	
	Config 3, 6		TBD	TBD	
	ssigned as RLM RS		[0]	[0]	
OCNG parar	neters		Table A.3.2.1.1-1	Table A.3.2.1.1-1	
CP length			Normal	Normal	
Correlation N Configuration			[2x2 Low]	[2x2 Low]	
	DCI format		1-0	1-0	
Out of	Number of Control OFDM symbols		2	2	
sync transmissi	Aggregation level	CC E	8	8	
on parameter s	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4	4	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4	4	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	0FF	
Gap pattern	ID		[N.A.]	*[<i>gp0</i>]	
	Layer 3 filtering		Enabled	Enabled	
T310 timer			0	0	
T311 timer			1000	1000	
N310			1	1	
N311 NZP CSI-RS	N311 NZP CSI-RS configuration		1 TBD	1 TBD	
ZP CSI-RS			TBD	TBD	
CSI-IM confi			TBD	TBD	
Periodic CSI	-		PUCCH	PUCCH	
CSI reporting		slot	[5]	[5]	
periodicity T1	Config 3, 6		[10] 1	[10] 1	
_ 1 1		S	I	<u>l</u>	

T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1:	3			

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

E-UTRAN is in non-DRX mode under test. Note 3:

Table A.4.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit		Test 1			Test 2	
			T1	T2	T3	T1	T2	T3
PDCCH	PDCCH_beta		4		4			
PDCCH	_DMRS_bet	dB		4			4	
а				4			4	
PBCH_b	eta	dB						
PSS_be	ta	dB						
SSS_be	ta	dB		0			0	
PDSCH	_beta	dB						
OCNG_I	OCNG_beta							
SNR	Config 1,	dB	[1]	[-7]	[-15]	[1]	[-7]	[-15]
	Config 2, 5	1	[1]	[-7]	[-15]	[1]	[-7]	[-15]
	Config 3, 6		[1]	[-7]	[-15]	[1]	[-7]	[-15]
N_{oc}	Config 1, 4	dBm/ 15K				[-98]		
	Config 2, 5	Hz	[-98]				[-98]	
	Config 3, 6		[-98]				[-98]	
Propaga condition			[ΤΙ	DL-C 300ns 100)Hz]	[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 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.4.5.1.1.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE Note 5: which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 2
rieiu	Value
gapOffset	[0]
Note 1: E-l	JTRAN PCell and PSCell are
SF	N-synchronous and frame
bou	undary aligned. (Ensure that
RL	M RS is partially overlapped
wit	n measurement gap).

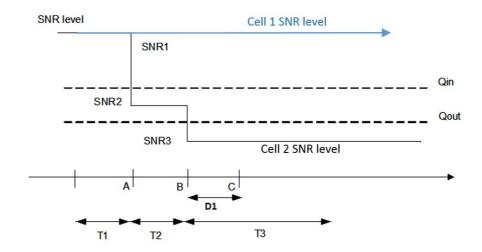


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

A.4.5.1.1.2 Test Requirements

The UE 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.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.

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, A.4.5.1.2.1-3, and A.4.5.1.2.1-4 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 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. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.4.5.1.2.1-1: Supported test configurations for FR1 PSCell

Configuration	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 30 KHz 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 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note: The UE is only	Note: 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	Va	alue
			Test 1	Test 2
Active E-UTRA PCell			Cell 1	Cell 1
E-UTRA RF Channel	Number		1	1
Active PSCell			Cell 2	Cell 2
RF Channel Number			2	2
Duplex mode	Config 1, 4		FDD	FDD
	Config 2, 3,		TDD	TDD
TDD Configuration	5, 6 Config 1, 4		Not Applicable	Not Applicable
Conliguration	Config 1, 4		Not Applicable [TDDConf.1.1]	Not Applicable [TDDConf.1.1]
	Config 3, 6		[TDDConf.1.2]	[TDDConf.1.2]
CORESET Reference			[CR. 1.1 FDD]	[CR. 1.1 FDD]
Channel	Config 2, 5		[CR. 1.1 TDD]	[CR. 1.1 TDD]
	Config 3, 6	1	[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB Configuration	Config 1, 4		Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1
	Config 2, 5	1	Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1
	Config 3, 6		Table A.3.2.2.1.2-1	Table A.3.2.2.1.2-1
SMTC Configuration	Config 1, 2,		Table A.3.2.3.1-1	Table A.3.2.3.1-1
-	4, 5]		
	Config 3, 6		Table A.3.2.3.1-1	Table A.3.2.3.1-1
PDSCH/PDCCH	Config 1, 2,		15 KHz	15 KHz
subcarrier spacing	4, 5	1	30 KHz	30 KHz
	Config 3, 6			
PRACH Configuration	Config 1, 2, 4, 5		TBD	TBD
	Config 3, 6		TBD	TBD
SSB index assigned	as RLM RS		[0]	[0]
OCNG parameters			Table A.3.2.1.1-1	Table A.3.2.1.1-1
CP length			Normal	Normal
Correlation Matrix an Configuration	d Antenna		[2x2 Low]	[2x2 Low]
<u> </u>	DCI format		1-0	1-0
	Number of		2	2
In sync	Control OFDM			
transmission	symbols			
parameters	Aggregation level	CCE	4	4
	Ratio of hypothetical	dB	0	0
	PDCCH RE			
	energy to average			
	SSS RE energy			
	Ratio of	dB	0	0
	hypothetical			
	PDCCH DMRS			
	energy to average			
	SSS RE energy		DEC houselle size	DEC hondle size
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size	 	6	6
Out of sync	DCI format	-	1-0	1-0
transmission	Number of	<u> </u>	2	2
parameters	Control OFDM		_	
	symbols	<u> </u>		
	Aggregation level	CCE	8	8
	Ratio of	dB	4	4
	hypothetical			
	PDCCH RE			
	energy to average SSS RE energy			
	Ratio of	dB	4	4
	hypothetical		, i	'
	PDCCH DMRS			
	energy to average			
1	SSS RE energy	1		

	DMRS precoder		REG bundle size	REG bundle size
	granularity REG bundle size		6	6
DRX	REG bundle size		OFF	OFF
Gap pattern ID			[N.A.]	*[gp0]
Layer 3 filtering			Enabled	Enabled
T310 timer		ms	2000	2000
T311 timer		ms	1000	1000
N310			1	1
N311			1	1
NZP CSI-RS configur	ation		TBD	TBD
ZP CSI-RS configura	tion		TBD	TBD
CSI-IM configuration			TBD	TBD
CSI-livi Coriliguration			160	TBD
- I II 001			7110011	7110011
Periodic CSI reporting	9		PUCCH	PUCCH
CSI reporting	Config 1, 2, 4,	slot	[5]	[5]
periodicity	5			
	Config 3, 6		[10]	[10]
T1		S	0.5	0.5
T2		S	0.4	0.4
T3		S	[1.46]	[1.36]
T4		S	0.4	0.4
T5		S	[1]	[1]
D1		S	[0.42]	[0.72]

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

F	Parameter	Unit	Test 1					Test 2				
			T1	T2	T3	T4	T5	T1	T2	Т3	T4	T5
PDCC	H_beta	dB			4			4				
PDCC	H_DMRS_beta	dB			4					4		
PBCH	_beta	dB										
PSS_b	eta	dB										
SSS_b	eta	dB			0					0		
PDSC	H_beta	dB										
OCNG	_beta	dB										
SNR	Config 1, 4	dB	[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
	Config 2, 5		[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
	Config 3, 6		[1]	[1] [-7] [-15] [-4.5] [1]				[1]	[-7]	[-15]	[-4.5]	[1]
N_{oc}	Config 1, 4	dBm/	[-98]			[-98]						
¹ V _{oc}	Config 2, 5	15	[-98]			[-98]						
	Config 3, 6	KHz	[-98]			[-98]						
Propag	gation condition			[TDL-0	C 300ns	100Hz]		[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 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 section [A.3.6].

Table A.4.5.1.2.1-4: Measurement gap configuration for in-sync tests in non-DRX mode

Field	Test 2
Field	Value
gapOffset	[TBD]
and frame boundary a	PSCell are SFN-synchronous aligned. (Ensure that RLM RS is with measurement gap).

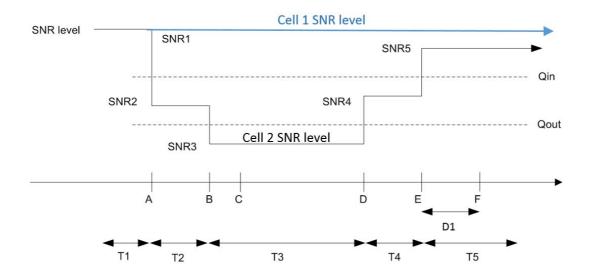


Figure A.4.5.1.2.1-1: SNR variation for in-sync testing

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%.

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.

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, A.4.5.1.3.1-3, A.4.5.1.3.1-4, and A.4.5.1.3.1-5. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be SSBs and FFS the corresponding power level

Table A.4.5.1.3.1-1: Supported test configurations for FR1 PSCell

Configuration	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 30 KHz 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 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is on	ly 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
l	ameter	Oille	Test 1
Active E-UTRA PO	Cell		Cell 1
E-UTRA RF Chan	nel Number		1
Active PSCell			Cell 2
RF Channel Numb			2
Duplex mode	Config 1, 4 Config 2, 3, 5, 6		FDD TDD
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		[TDDConf.1.1]
Comigaration	Config 3, 6		[TDDConf.1.2]
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		Table A.3.2.2.1.1-1
Configuration	Config 2, 5		Table A.3.2.2.1.1-1
	Config 3, 6		Table A.3.2.2.1.2-1
SMTC	Config 1, 2, 4, 5		Table A.3.2.3.1-1
Configuration	Config 3, 6		Table A.3.2.3.1-1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing	Config 3, 6		30 KHz
PRACH	Config 1, 2, 4, 5		TBD
Configuration	Config 3, 6		TBD
SSB index assign	_		
OCNG parameters			[0] Table A.3.2.1.1-1
CP length	3		Normal
Correlation Matrix	and Antenna		[2x2 Low]
Configuration			
	DCI format		1-0
0	Number of Control		2
Out of sync transmission	OFDM symbols	005	
parameters	Aggregation level Ratio of	CCE dB	8 4
parameters	hypothetical	ub	4
	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 cycle		ms	640
Gap pattern ID			[N.A.]
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311	auration		1 TBD
NZP CSI-RS confi	=		
ZP CSI-RS config			TBD
CSI-IM configurati			TBD
Periodic CSI reporting		1 .	PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]
periodicity T1	Config 3, 6	S	[10]
T2		S	0.4
T3		S	[7]
D1		S	[6.44]

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.

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			
PDCCH_b	eta	dB	4					
PDCCH_D	MRS_beta	dB		4				
PBCH_bet	а	dB						
PSS_beta		dB						
SSS_beta		dB	0					
PDSCH_be		dB						
OCNG_bet	ta	dB						
SNR	Config 1, 4	dB	[1]	[-7]	[-15]			
	Config 2, 5		[1]	[-7]	[-15]			
	Config 3, 6		[1]	[-7]	[-15]			
Λ/ Config 1, 4		dBm/15	[-98]					
N_{oc} Config 1, 4 Config 2, 5		KHz	[-98]					
Config 3, 6			[-98]					
Propagatio	n 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 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.

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.4.5.1.3.1-4: DRX-Configuration for out-of-sync tests.

	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-RetransmissionTimerDL	[sl1]
drx-RetransmissionTimerUL	[sl1]
longDRX-CycleStartOffset	[ms640]
shortDRX	disable

Table A.4.5.1.3.1-5: TimeAlignmentTimer-Configuration for out-of-sync tests.

Field	Test 1 Value	
TimeAlignmentTimer		infinity
periodicityAndOffset in	Config 1, 2, 4, 5	[sl5]
SchedulingRequestResourc eConfig	Config 3, 6	[sl10]

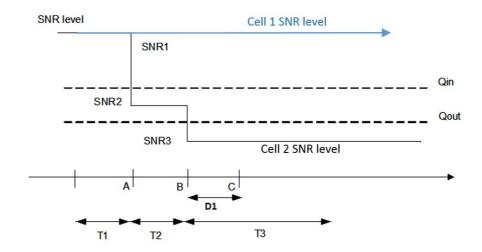


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing.

A.4.5.1.3.2 Test Requirements

The UE 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.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.

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, A.4.5.1.4.1-3, A.4.5.1.4.1-4 and A.4.5.1.4.1-5. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

Configuration	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 30 KHz 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 30 KHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only	y 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

Pa	arameter	Unit	Value
			Test 1
Active E-UTRA PC			Cell 1
E-UTRA RF Chann Active PSCell	iei Number		1 Cell 2
RF Channel Numb	er		2
Duplex mode	Config 1, 4		FDD
2 aprox mode	Config 2, 3, 5, 6		TDD
TDD Configuration			Not Applicable
	Config 2, 5		[TDDConf.1.1]
	Config 3, 6		[TDDConf.1.2]
CORESET Referen			[CR. 1.1 FDD]
Channel	Config 2, 5	_	[CR. 1.1 TDD]
00D 0 fi ti	Config 3, 6		[CR. 2.1 TDD]
SSB Configuration	Config 1, 4 Config 2, 5	-	Table A.3.2.2.1.1-1 Table A.3.2.2.1.1-1
	Config 2, 5	_	
SMTC Configuration	on Config 1, 2, 4, 5		Table A.3.2.2.1.2-1 Table A.3.2.3.1-1
Own Comigaratio	Config 3, 6		Table A.3.2.3.1-1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz
subcarrier spacing	•		
	Config 3, 6		30 KHz
PRACH Configurat			TBD
	Config 3, 6		TBD
SSB index assigne			[0] Table A.3.2.1.1-1
OCNG parameters CP length			Normal
Correlation Matrix	and Antenna		[2x2 Low]
Configuration	and / intornia		[ZAZ ZOW]
3	DCI format		1-0
	Number of Control		2
In sync	OFDM symbols		
transmission	Aggregation level	CCE	4
parameters	Ratio of hypothetical	dB	0
	PDCCH RE energy to average SSS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy	u u u	
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		_
0	REG bundle size		6
Out of sync transmission	DCI format Number of Control		1-0
parameters	OFDM symbols		2
parameters	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		1120 5411410 3120
	REG bundle size		6
DRX cycle		ms	40
Gap pattern ID		1	[N.A.]
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000

N310			1			
N311			1			
NZP CSI-RS configuration	on		TBD			
ZP CSI-RS configuration	1		TBD			
CSI-IM configuration			TBD			
Periodic CSI reporting			PUCCH			
CSI reporting	Config 1, 2, 4, 5	slot	[5]			
periodicity	Config 3, 6		[10]			
T1		S	4			
T2		S	1.6			
T3		S	[1.36]			
T4		S	0.4			
T5		S	0.4			
D1		S	[1]			
Note 1: All configurati	ons are assigned to t	he UE pi	rior to the start of time period			
T1.						
	DCCH is not transmit		T1 starts.			
Note 3: E-UTRAN is i	n non-DRX mode und	der test.				

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
PDCCH_beta	dB		•	4		
PDCCH_DMRS_bet	dB			4		
а						
PBCH_beta	dB					
PSS_beta	dB					
SSS_beta	dB			0		
PDSCH_beta	dB					
OCNG_beta	dB					
SNR Config 1, 4	dB	[1]	[-7]	[-15]	[-4.5]	[1]
Config 2, 5		[1]	[-7]	[-15]	[-4.5]	[1]
Config 3, 6		[1]	[-7]	[-15]	[-4.5]	[1]
M Config 1, 4	dBm/	·	·	[-98]	<u> </u>	
N_{oc} Config 1, 4 Config 2, 5	15			[-98]		
Config 3, 6	KHz			[-98]		
Propagation condition				DL-C 300ns 100l	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 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.4.5.1.4.1-1.

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 section [A.3.6].

Table A.4.5.1.4.1-4: DRX-Configuration for in-sync tests

Field	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-	[sl1]
RetransmissionTimerDL	
drx-	[sl1]
RetransmissionTimerUL	
longDRX-	[ms40]
CycleStartOffset	
shortDRX	disable

Table A.4.5.1.4.1-5: TimeAlignmentTimer -Configuration for in-sync testing

Field	Test 1 Value	
TimeAlignmentTimer		infinity
periodicityAndOffset in	Config 1, 2, 4, 5	[sl5]
SchedulingRequestResourc eConfig	Config 3, 6	[sl10]

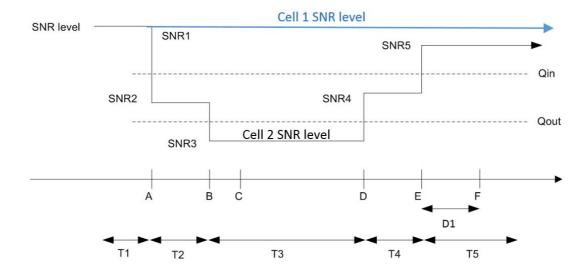


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

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, and A.4.5.1.5.1-3 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 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 of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test2.

Table A.4.5.1.5.1-1: Supported test configurations for FR1 PSCell

Configuration	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	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	Va	lue
			Test 1	Test 2
Active E-UTRA PCell			Cell 1	Cell 1
	Channel Number		1	1
Active PSCe			Cell 2	Cell 2
RF Channel			2	2
Duplex mode		}	FDD	FDD
	Config 2, 3, 5, 6		TDD	TDD
TDD	Config 1, 4		Not Applicable	Not Applicable
Configuration			[TDDConf.1.1]	[TDDConf.1.1]
CORESET	Config 3, 6 Config 1, 4		[TDDConf.1.2] [CR. 1.1 FDD]	[TDDConf.1.2] [CR. 1.1 FDD]
Reference	Config 1, 4	}	[CR. 1.1 TDD]	[CR. 1.1 TDD]
Channel	Config 3, 6	1 }	[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1, 4		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration		1	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
	Config 3, 6	1 1	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2, 4,		FR1 patterm 1	FR1 patterm 1
Configuration				
DDCC!!/DEC	Config 3, 6		FR1 patterm 2	FR1 patterm 2
PDSCH/PDC H subcarrier	5		15 KHz	15 KHz
spacing	Config 3, 6		30 KHz	30 KHz
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG parar	neters		TBD	TBD
CP length			Normal	Normal
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]
Out of sync	DCI format		1-0	1-0
transmissio n	Number of Control OFDM symbols		2	2
parameters	Aggregation level	CC	8	8
	Ratio of	E dB	4	4
	hypothetical PDCCH RE energy			
	to average CSI-RS RE energy			
	Ratio of	dB	4	4
	hypothetical PDCCH DMRS			
	energy to average CSI-RS RE energy			
	DMRS precoder		REG bundle size	REG bundle size
	granularity REG bundle size		6	6
DRX	I IVEO DUITUIE SIZE		OFF	OFF
Gap pattern	ID		[N.A.]	*[<i>gp0</i>]
Layer 3 filter			Enabled	Enabled
T310 timer	T310 timer		0	0
T311 timer		ms ms	1000	1000
N310			1	1
N311			1	1
	NZP CSI-RS configuration		[Resourceld 1]	[Resourceld 0]
	ZP CSI-RS configuation		TBD TBD	TBD TBD
	CSI-IM configuration Periodic CSI reporting		PUCCH	PUCCH
	· ·	ClO+		
CSI reporting periodicity	Config 1, 2, 4, 5 Config 3, 6	slot	[5] [10]	[5] [10]
T1		S	1	1
T2		S	0.4	0.4

T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1: Note 2:	UE-specific PDCCH is no E-UTRAN is in non-DRX			

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

Parameter		Unit		Test 1		Test 2		
			T1	T2	T3	T1	T2	T3
PDCCH	beta	dB		4			4	•
	_DMRS_bet	dB		4			4	
а								
PBCH_b	beta	dB						
PSS_be	eta	dB						
SSS_be	eta	dB		0			0	
PDSCH	_beta	dB						
OCNG_	beta	dB						
SNR	Config 1,	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2, 5		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3,		TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	0 0 1 1 1 1 1 1			[-98]	[-98]			
Config 2, 5		Hz	[-98]			[-98]		
	Config 3,			[-98]		[-98]		
Propagation condition			[TDL-C 300ns 100Hz]		[TDL-C 300ns 100Hz]			

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.

NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time Note 3: period T1.

Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 4:

The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 5:

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.

Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.5.1-1.

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.4.5.1.5.1-3: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Test 2	
	Value	
	[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.4.5.1.5.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field		Resourceld 0	Resourceld 1
		Value	Value
frequency Ilocation ^N	yDomainA lote 1	row1	row2
startingR	В	0	0
nrofRBs		Note 2	Note 2
Note 1:	TS 38.211	[6] table 7.4.1.5.3-	1
Note 2:		derived based on t	
	Configurat	tion in Table A.4.5.1	.5.1-1

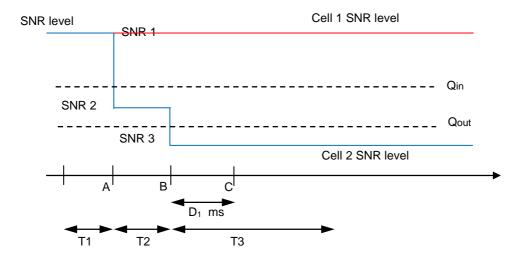


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1 (E-UTRAN PCell).

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 ($D_1 = [TBD]$ ms 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, A.4.5.1.6.1-3, A.4.5.1.6.1-4, A.4.5.1.6.1-5, and A.4.5.1.6.1-6 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 of [5] or [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 4.

Table A.4.5.1.6.1-1: Supported test configurations for FR1 PSCell

Configuration	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 it	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

Parameter		Unit	Value		
			Test 3	Test 4	
	Active E-UTRA PCell		Cell 1	Cell 1	
	E-UTRA RF Channel Number		1	1	
Active PSCe			Cell 2	Cell 2	
RF Channel			2	2	
Duplex mode		_	FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD	Config 1, 4		Not Applicable	Not Applicable	
Configuration			[TDDConf.1.1]	[TDDConf.1.1]	
CODECET	Config 3, 6		[TDDConf.1.2]	[TDDConf.1.2]	
CORESET	Config 1, 4		[CR. 1.1 FDD]	[CR. 1.1 FDD]	
Reference Channel	Config 2, 5		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
	Config 3, 6		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1, 4		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
CNATO	Config 3, 6		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC Configuration			FR1 patterm 1	FR1 patterm 1	
	Config 3, 6		FR1 patterm 2	FR1 patterm 2	
PDSCH/PDC H subcarrier	5		15 KHz	15 KHz	
spacing	Config 3, 6		30 KHz	30 KHz	
csi-RS-Index RS	assigned as RLM		[0]	[0]	
OCNG parar	neters		TBD	TBD	
CP length			Normal	Normal	
	Matrix and Antenna		[2x2 Low]	[2x2 Low]	
garana	DCI format		1-0	1-0	
Out of sync	Number of Control OFDM symbols		2	2	
transmissio	Aggregation level	CC E	8	8	
parameters	Ratio of	dB	4	4	
	hypothetical PDCCH RE energy to average CSI-RS RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
	DCI format		1-0	1-0	
In sync	Number of Control OFDM symbols		2	2	
transmissio	Aggregation level	CC	4	4	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	

F	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pattern ID			[N.A.]	*[<i>gp0</i>]	
Layer 3 filtering			Enabled	Enabled	
T310 timer		ms	0	0	
T311 timer		ms	1000	1000	
N310			1	1	
N311			1	1	
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS cor	ZP CSI-RS configuation		TBD	TBD	
CSI-IM configu	ration		TBD	TBD	
Periodic CSI re	porting		PUCCH	PUCCH	
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]	
periodicity Config 3, 6			[10]	[10]	
T1		S	1	1	
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1			[0.24]	[0.44]	
Note 1: LIE apositio DDCCH is not transmitted after T1 starts					

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

Pa	Parameter			Test 3			Test 4	
			T1	T2	T3	T1	T2	T3
PDCCH	_beta	dB	4				4	
PDCCH	_DMRS_bet	dB		4			4	
а								
PBCH_I	beta	dB						
PSS_be	eta	dB						
SSS_be	eta	dB		0			0	
PDSCH	_beta	dB						
OCNG_	beta	dB						
SNR	Config 1,	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2, 5		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3,		TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1,	dBm/ 15K	[-98]			[-98]		
Config 2, 5 Config 3, 6		Hz	[-98]			[-98]		
				[-98]		[-98]		
Propaga condition			[TD	L-C 300ns 100)Hz]	[TD	L-C 300ns 100	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 and T3 is denoted as SNR1, SNR2 and SNR3 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.4.5.1.6.1-3: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 4				
	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.4.5.1.6.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1
	Value	Value
frequencyDomainAllocatio n ^{Note 1}	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 1: TS 38.211 [6] table		Configuration

nrofRBs is derived based on the Configuration

in Table A.4.5.1.6.1-1

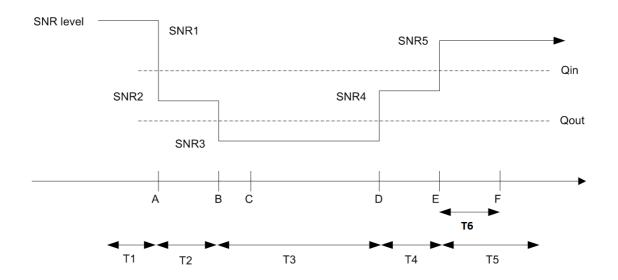


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

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 of [5] or [10] 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 6.

Table A.4.5.1.7.1-1: Supported test configurations for FR1 PSCell

Configuration	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 onl	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	Va	lue
			Test 5	Test 6
	Active E-UTRA PCell		Cell 1	Cell 1
	E-UTRA RF Channel Number		1	1
Active PSCe			Cell 2	Cell 2
RF Channel			2	2
Duplex mode		}	FDD TDD	FDD
	Config 2, 3, 5, 6			TDD
TDD	Config 1, 4		Not Applicable	Not Applicable
Configuration		}	[TDDConf.1.1] [TDDConf.1.2]	[TDDConf.1.1] [TDDConf.1.2]
CORESET	Config 3, 6 Config 1, 4		[CR. 1.1 FDD]	[CR. 1.1 FDD]
Reference	Config 2, 5	}	[CR. 1.1 TDD]	[CR. 1.1 TDD]
Channel	Config 3, 6	}	[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1, 4		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
	Config 3, 6	i i	TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2, 4,		FR1 patterm 1	FR1 patterm 1
Configuration				
DDCC!!/SE	Config 3, 6		FR1 patterm 2	FR1 patterm 2
PDSCH/PDC H subcarrier	5		15 KHz	15 KHz
spacing	Config 3, 6		30 KHz	30 KHz
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG parar	neters		TBD	TBD
CP length			Normal	Normal
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]
J	DCI format		1-0	1-0
0	Number of Control		2	2
Out of sync transmissio	OFDM symbols	00	0	0
n	Aggregation level	CC E	8	8
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
DRX			640	640
Gap pattern			[N.A.]	*[gp0]
Layer 3 filter	ing		Enabled	Enabled
T310 timer			0	0
T311 timer		ms	1000	1000
N310			<u> </u>	1 1
N311 NZP CSI-RS configuration			1 [Resourceld 1]	[Resourceld 0]
	ZP CSI-RS configuation		TBD	TBD
CSI-IM confi	-		TBD	TBD
Periodic CSI			PUCCH	PUCCH
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]
periodicity	Config 3, 6		[10]	[10]
T1		S S	1	1
12	T2		0.4	0.4

T3		s	[0.6]	[0.6]		
D1		S	[0.24]	[0.44]		
Note 1:	UE-specific PDCCH is not transmitted after T1 starts.					
Note 2:	E-UTRAN is in non-DRX mode under test.					

Table A.4.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit		Test 5		Test 6		
			T1	T2	T3	T1	T2	T3
PDCCH beta		dB	4				4	
PDCCH_	DMRS_bet	dB		4			4	
а								
PBCH_b	eta	dB						
PSS_bet	а	dB						
SSS_bet	а	dB		0			0	
PDSCH_	beta	dB						
OCNG_b	eta	dB						
SNR	Config 1,	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2, 5		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3,		TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1,	dBm/ 15K		[-98]			[-98]	
	Config 2, 5	Hz		[-98]			[-98]	
	Config 3,			[-98]			[-98]	
Propagation condition			[TD	[TDL-C 300ns 100Hz]			L-C 300ns 100)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 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.7.1-1.

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.4.5.1.7.1-3: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in 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.4.5.1.7.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode

Field	Resourceld 0	
	Value	Value
frequencyD omainAlloca tion ^{Note 1}	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 2: nro	38.211 [6] table fRBs is derived nfiguration in Ta	based on the

Table A.4.5.1.7.1-5: DRX-Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
rieid	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table A.4.5.1.7.1-6: TimeAlignmentTimer -Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field		Test 5	Test 6
Fleid		Value	Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in SchedulingRequestResourc	Config 1, 2, 4, 5	[sl5]	[sl5]
eConfig	Config 3, 6	[sl10]	[sl10]

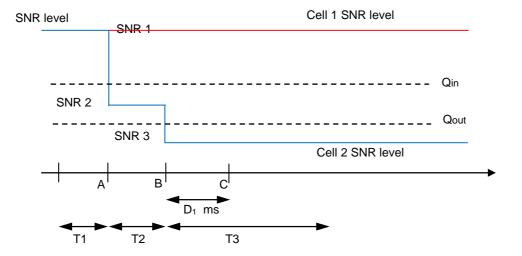


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1 (E-UTRAN PCell).

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 ($D_1 = [TBD]$ ms 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.4.5.1.81-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-4 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 of [5] or [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 7.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	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 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 non-DRX mode

Parameter		Unit	Va	ue	
			Test 7	Test 8	
Active E-UTF			Cell 1	Cell 1	
	Channel Number		1	1	
Active PSCe			Cell 2	Cell 2	
RF Channel			2	2	
Duplex mode		_	FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD	Config 1, 4		Not Applicable	Not Applicable	
Configuration			[TDDConf.1.1]	[TDDConf.1.1]	
CODECET	Config 3, 6		[TDDConf.1.2]	[TDDConf.1.2]	
CORESET Reference	Config 1, 4		[CR. 1.1 FDD]	[CR. 1.1 FDD]	
Channel	Config 2, 5		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
	Config 3, 6		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1, 4		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC	Config 3, 6		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
Configuration			FR1 patterm 1	FR1 patterm 1	
	Config 3, 6		FR1 patterm 2	FR1 patterm 2	
PDSCH/PDC H subcarrier	5		15 KHz	15 KHz	
spacing	Config 3, 6		30 KHz	30 KHz	
csi-RS-Index RS	assigned as RLM		[0]	[0]	
OCNG parar	neters		TBD	TBD	
CP length			Normal	Normal	
	Matrix and Antenna		[2x2 Low]	[2x2 Low]	
garana	DCI format		1-0	1-0	
Out of sync	Number of Control		2	2	
transmissio n	Aggregation level	CC E	8	8	
parameters	Ratio of	dB	4	4	
	hypothetical PDCCH RE energy to average CSI-RS RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
	DCI format	1	1-0	1-0	
In sync	Number of Control		2	2	
transmissio	ransmissio Aggregation level		4	4	
parameters Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy		dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy		0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	

REG bundle size			6	6	
DRX			640	640	
Gap pattern ID			[N.A.]	*[<i>gp0</i>]	
Layer 3 filtering	g		Enabled	Enabled	
T310 timer		ms	0	0	
T311 timer		ms	1000	1000	
N310			1	1	
N311			1	1	
NZP CSI-RS c	onfiguration		[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS co	nfiguation		TBD	TBD	
CSI-IM configu	ıration		TBD	TBD	
Periodic CSI re	eporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]	
periodicity Config 3, 6			[10]	[10]	
T1		S	1	1	
T2		S	0.4	0.4	
T3	T3		[0.6]	[0.6]	
D1	S		[0.24]	[0.44]	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit		Test 7			Test 8		
			T1	T2	T3	T1	T2	Т3	
PDCCH	_beta	dB	4			4			
PDCCH	_DMRS_bet	dB		4			4		
а									
PBCH_I	beta	dB							
PSS_be	eta	dB							
SSS_be	eta	dB		0		0			
PDSCH	_beta	dB							
OCNG_	beta	dB							
SNR	Config 1,	dB	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2, 5		TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3,		TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	Config 1,	dBm/ 15K		[-98]			[-98]		
	Config 2, 5	Hz	[-98]				[-98]		
	Config 3,		[-98]				[-98]		
Propaga conditio			[TDL-C 300ns 100Hz]		[TD	L-C 300ns 100)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 and T3 is denoted as SNR1, SNR2 and SNR3 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.4.5.1.8.1-3: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field		Test 8
	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.4.5.1.8.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1	
	Value	Value	
frequencyD omainAlloca tion ^{Note 1}	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 2: nro	TS 38.211 [6] table 7.4.1.5.3-1 nrofRBs is derived based on the Configuration in Table A.4.5.1.8.1-1		

Table A.4.5.1.8.1-5: DRX-Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
rieiu	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table A.4.5.1.8.1-6: TimeAlignmentTimer -Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode.

Field		Test 5 Value	Test 6 Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in	Config 1, 2, 4, 5	[sl5]	[sl5]
SchedulingRequestResourc eConfig	Config 3, 6	[sl10]	[sl10]

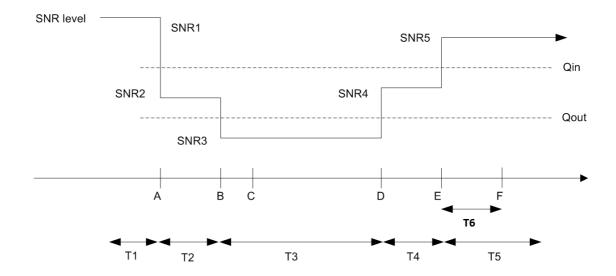


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

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 ENDC specified in section 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 whole 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, 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 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		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		ON	DRX related parameters are defined in
		ON	Table A.4.5.2.1.1-3
Measurement gap pattern		OFF	
ld		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

Parameter		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	
J. J	Config 2,5		TDDConf.1.1	
	Config 3,6	1	TDDConf.2.1	
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	
_ · · channel	Config 2,5		10: N _{RB,c} = 52	
	Config 3,6		40: N _{RB,c} = 106	
Initial BWP	Config 1,4		DLBWP.0.2 ^{Note5}	
Configuration	Config 2,5	1	DLBWP.0.2 ^{Note5}	
Comgaration	Config 3,6	-	DLBWP.0.2 ^{Note5}	
PDSCH Reference	Config 1,4		SR.1.1 FDD	
measurement channel	Config 2,5		SR.1.1 TDD	
l lieasurement channel	Config 2,5	1	SR2.1 TDD	
RMSI CORESET				
	Config 1,4	4	CR.1.1 FDD	
parameters	Config 2,5	1	CR.1.1 TDD	
DD001100DE0ET	Config 3,6		CR2.1 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	
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 PBCH DMRS				
EPRE ratio of PBCH to PBC		1		
EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to P		dB	0	
EPRE ratio of PDSCH DMF		ub	0	
EPRE ratio of PDSCH to P		-		
EPRE ratio of OCNG DMR		1		
EPRE ratio of OCNG to OC				
Noc ^{Note 2}	, ,	dBm/15	T 4041	
		kHz	[-104]	
SS-RSRP Note 3		dBm/15	1.073	
		kHz	[-87]	
Ês/lot		dB	17	
Ês/Noc		dB	17	
Noc ^{Note 2}	Config 1,2,4,5	dBm/SCS	[-104]	
	Config 3,6	1	[-101]	
IoNote3		dBm/	[-59]	
Config 1,2,4,5		9.36MHz	[00]	
		dBm/	[-61.9]	
	Config 3,6		[01.0]	
Time offset to cell1 Note 4	1	38.16MHz μs	33	
Propagation Condition		μο	AWGN	
i iopagation condition		1	AVVOIN	

- 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: 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: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

Table A.4.5.2.1.1- 4: E-UTRAN PCell DRX-Configuration for E-UTRAN - NR FR1 interruption at transitions between active and non-active during DRX in synchronous DC

Field	Cell1	Comment
rieid	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer ^{Note 1}	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled	I	

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

μ	NR Slot	Interruption length X		
,	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 section 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.4.5.2.2.1-2 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 whole 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, 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 required to be tested in one of the supported test configurations			

Table A.4.5.2.2.1-1: 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
		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		ON	DRX related parameters are defined in
		ON	Table A.4.5.2.3.1-3
Measurement gap pattern		OFF	
ld		OFF	
T1	S	10	

Table A.4.5.2.2.1-2: 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	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	1	TDDConf.2.1	
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	
	Config 2,5	1	10: N _{RB,c} = 52	
	Config 3,6		40: N _{RB,c} = 106	
Initial BWP	Config 1,4		DLBWP.0.2 ^{Note5}	
Configuration	Config 2,5		DLBWP.0.2 ^{Note5}	
g	Config 3,6		DLBWP.0.2 ^{Note5}	
PDSCH Reference	Config 1,4		SR.1.1 FDD	
measurement channel	Config 2,5	1	SR.1.1 TDD	
moded of form of driving	Config 3,6		SR2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	
parameters	Config 2,5	+	CR.1.1 TDD	
parameters	Config 3,6	1	CR2.1 TDD	
PDCCH CORESET			CCR.1.1 FDD	
	Config 1,4	-		
parameters	Config 2,5		CCR.1.1 TDD	
OONO Detterne	Config 3,6		CCR.2.1 TDD	
OCNG Patterns			OP.1	
SMTC Configuration	10 " 1015		SMTC.1	
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	
Config 3,6			SSB.2 FR1	
Correlation Matrix and A	ntenna		1x2 Low	
Configuration				
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	. to CCC			
EPRE ratio of PBCH to PBC		1		
EPRE ratio of PDCCH DMF				
EPRE ratio of PDCCH to P		dB	0	
EPRE ratio of PDSCH DMF		. a.5		
EPRE ratio of PDSCH to PI	DSCH	1		
EPRE ratio of OCNG DMRS				
EPRE ratio of OCNG to OC	NG DMRS (Note 1)			
N _{oc} Note 2		dBm/15 kHz	[-104]	
SS-RSRP Note 3		dBm/15		
OO RON		kHz	[-87]	
Ês/lot		dB	17	
És/Noc		dB	17	
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104]	
INOC	Config 1,2,4,5	ubii/303	[-104]	
Io ^{Note3}		dBm/	[-59]	
IU	Config 1,2,4,5	9.36MHz	[-22]	
Config 3,6		dBm/	[-61.9]	
		38.16MHz	[ق.ا ۵-]	
Time offset to cell1 Note 4		30.10IVIΠ2 μS	500	
			AWGN	
Propagation Condition		the selle one feel		

- 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: 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: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

Table A.4.5.2.2.1-3: E-UTRAN PCell DRX-Configuration for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Field	Cell1	Comment
rieid	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer ^{Note 1}	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf320	
shortDRX	disable	
Note 1: UE is continuously scheduled	I	

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

//	NR Slot	Interruption length X	
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 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 NR PSCell in EN-DC specified in section 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 Cell 3 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, 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 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 two are 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, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
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

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
•	Config 2,3,5,6	1	TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
3	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	†	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.0,2 ^{Note6}	DLBWP.0.2 Note6
Configuration	Config 2,5	1	DLBWP.0.2 Note6	DLBWP.0.2 Note6
Comiguration	Config 3,6	† F	DLBWP.0.2 Note6	DLBWP.0.2 Note6
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5	+	SR.1.1 TDD	
measurement channel	Config 2,5	┨	SR2.1 TDD	
RMSI CORESET		+	CR.1.1 FDD	CR.1.1 FDD
parameters	Config 1,4	-	CR.1.1 FDD CR.1.1 TDD	CR.1.1 FDD CR.1.1 TDD
parameters	Config 2,5	-		
PDCCH CORESET	Config 3,6		CR2.1 TDD	CR2.1 TDD
	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
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
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 A	Intenna		1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SSS	2 (- 000	4		
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC		4		
EPRE ratio of PDCCH DMF	28 to 888	1		
EPRE ratio of PDCCH to P		dB	0	0
EPRE ratio of PDSCH DMF		- ub	O .	
EPRE ratio of PDSCH to PI		1		
EPRE ratio of OCNG DMR		1		
EPRE ratio of OCNG to OC	NG DMRS (Note 1)			
N _{oc} Note 2		dBm/15 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 1,2,4,5	dBm/S	[-104]	[-104]
INoc. 1010 E	_	4 4511/5	[-104]	[-104]
	Config 3,6		[-101]	[-101]
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	[-59]	[-59]
	Config 3,6	dBm/ 38.16MHz	[-61.9]	[-61.9]
Time offset to cell1 Note 4		μs	33	33
Time offset to cell2 Note 5		μs	- -	3
Propagation Condition		MO	AWGN	AWGN
opagation Condition	Propagation Condition		/ (17 014	, (V V O1 V

- 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: 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.
- 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 TS 38.213 [3] section 12.

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

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 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 NR PSCell in EN-DC specified in section 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 Cell 3 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, 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	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 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		OFF	
Id		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

Parame	ter	Unit	Cell 2	Cell 3
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
G	Config 2,5		TDDConf.1.1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1	TDDConf.2.1
3W _{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		40: N _{RB,c} = 106	40: N _{RB,c} = 106
nitial BWP	Config 1,4		DLBWP.0.2 ^{Note6}	DLBWP.0.2 ^{Note6}
Configuration	Config 2,5		DLBWP.0.2 ^{Note6}	DLBWP.0.2 ^{Note6}
3	Config 3,6		DLBWP.0.2 ^{Note6}	DLBWP.0.2 ^{Note6}
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
neasurement channel	Config 2,5	1	SR.1.1 TDD	-
	Config 3,6	1	SR2.1 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
, and in otto io	Config 3,6	† <u> </u>	CR2.1 TDD	CR2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 1,4	┥ ├─	CCR.1.1 TDD	CCR.1.1 TDD
Darameters		 	CCR.2.1 TDD	CCR.1.1 TDD
Config 3,6 OCNG Patterns			OP.1	OP.1
	Config 1 2 1 E		SSB.1 FR1	SSB.1 FR1
SSB Configuration	Config 1,2,4,5			
Config 3,6			SSB.2 FR1	SSB.2 FR1
SMTC Configuration Correlation Matrix and Antenna			SMTC.1	SMTC.1
	intenna		1x2 Low	1x2 Low
Configuration 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 P		dB	0	0
EPRE ratio of PDSCH DMF		1	-	
EPRE ratio of PDSCH to P				
EPRE ratio of OCNG DMR	S to SSS(Note 1)			
EPRE ratio of OCNG to OC	NG DMRS (Note 1)			
Noc Note 2		dBm/15 kHz	[-104]	[-104]
SS-RSRP Note 3		dBm/15	[-87]	[-87]
		kHz		
Ês/lot		dB	17	17
Ē _s /N _{oc}		dB	17	17
Noc ^{Note 2}	Config 1,2,4,5	dBm/SCS	[-104]	[-104]
	Config 3,6		[-101]	[-101]
O ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	[-59]	[-59]
	Config 3,6	dBm/	[-61.9]	[-61.9]
Time offset to cell1 Note 4		38.16MHz	3	3
		ms	3	3
Fime offset to cell2 Note 5		μs	-	_
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 Io 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.
- 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 TS 38.213 [3] section 12.

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

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 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 NR PSCell in EN-DC specified in section 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

Confi	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	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.5.1-1: 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 two are 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, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	s	10	

Table A.4.5.2.5.1-2: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter		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.2.1
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
Initial BWP	Config 1,4		DLBWP.0.2 ^{Note5}
Configuration	Config 2,5		DLBWP.0.2 ^{Note5}
g	Config 3,6		DLBWP.0.2 ^{Note5}
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	-	SR.1.1 TDD
measurement channel	Config 3,6	-	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
		+	
parameters	Config 2,5	4	CR.1.1 TDD
DMO CODECET	Config 3,6		CR2.1 TDD
RMC CORESET	Config 1,4	_	CCR.1.1 FDD
parameters	Config 2,5	-	CCR.1.1 TDD
00110 5	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
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 PBCH DMRS		4	
EPRE ratio of PBCH to PBC		_	
EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to PI		dB	0
EPRE ratio of PDSCH DMR		- ub	0
EPRE ratio of PDSCH to PI	7.S.C.H	-	
EPRE ratio of OCNG DMRS		-	
EPRE ratio of OCNG to OC			
Noc ^{Note 2}	, ,	dBm/15	
		kHz	[-104]
SS-RSRP Note 3		dBm/15	
		kHz	[-87]
Ê _s /I _{ot}		dB	17
Ês/Noc		dB	17
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104]
1 100	Config 3,6	42.1,7000	[-101]
Io ^{Note3}		dBm/	[-59]
10	Config 1,2,4,5	9.36MHz	[00]
		dBm/	[-61.9]
Config 3,6		38.16MHz	[01.0]
Time offset to cell1 Note 4			33
		μs	AWGN
	Propagation 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 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

Note 5: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

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 μ	length (ms)	Sync	
0	1	1	1
1	0.5	1	1

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 section 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, 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	Note: 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, 2	One is E-UTRAN RF channel and the
		1, 2	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		OFF	
Id		OFF	
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

Parameter		Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
•	Config 2,3,5,6	1	TDD
TDD configuration	Config 1,4		Not Applicable
3	Config 2,5	1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BWchannel	Config 1,4		10: N _{RB,c} = 52
	Config 2,5	1	10: N _{RB,c} = 52
	Config 3,6	1	40: N _{RB,c} = 106
Initial BWP	Config 1,4		DLBWP.0.2 ^{Note5}
Configuration	Config 2,5		DLBWP.0.2 ^{Note5}
3	Config 3,6		DLBWP.0.2 ^{Note5}
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	1	SR.1.1 TDD
modearement channel	Config 3,6	1	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
parameters	Config 3,6	-	CR2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 1,4	-	CCR.1.1 TDD
parameters	Config 2,5	-	CCR.2.1 TDD
OCNG Patterns	Coning 3,6		OP.1
SMTC Configuration	06-4045		SMTC.1
SSB Configuration	Config 1,2,4,5	_	SSB.1 FR1
O 1 1: 14 1: 14	Config 3,6		SSB.2 FR1
Correlation Matrix and A	ntenna		1x2 Low
Configuration EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS	2 to 222	-	
EPRE ratio of PBCH to PBC		1	
EPRE ratio of PDCCH DMF		1	
EPRE ratio of PDCCH to PI		dB	0
EPRE ratio of PDSCH DMR			
EPRE ratio of PDSCH to PI			
EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OC	NG DMRS (Note 1)		
N _{oc} Note 2		dBm/15 kHz	[-104]
SS-RSRP Note 3		dBm/15 kHz	[-87]
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104]
00	Config 3,6	==:::,====	[-101]
Io ^{Note3}		dBm/	[-59]
	Config 1,2,4,5	9.36MHz	[20]
		dBm/	[-61.9]
	Config 3,6	38.16MHz	[51.0]
Time offset to cell1 Note 4	1	μ\$	500
Propagation Condition		μο	AWGN
	a used such that ha	th colle are fully	v allocated and a constant total transmitted nower

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 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: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in TS 38.213 [3] section 12.

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.

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 E-UTRAN PCell and 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

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.7 E-UTRA – NR FR1 interruptions at UL carrier RRC reconfiguration for NR SCell

A.4.5.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that when a supplementary UL carrier or a UL carrier is configured or released on a SCell, the interruption on the PSCell does not exceed the limits. The test will verify the interruption requirements during SUL carrier reconfiguration in clause 8.2.1.2.6.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell3). PSCell is continuously scheduled in downlink and uplink during the whole test duration. The test parameters for PSCell and NR Scell are given in Table A.4.5.2.7.1-1, Table A.4.5.2.7.1-2, Table A.4.5.2.7.1-3 and Table A.4.5.2.7.1-4 below and the test parameters and applicability for the E-UTRAN cell 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 there is a NR uplink carrier on cell3. During time duration T2, a supplementary UL carrier is configured for SCell through *RRCReconfiguration*. During time duration T3, the supplementary UL carrier is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. Duringtime duration T1 there is a supplementray NR uplink carrier on cell3. During time duration T2, a NR UL carrier is configured for SCell through *RRCReconfiguration*. During time duration T3, the NR UL carrier is released through *RRCReconfiguration*.

Table A.4.5.2.7.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
2	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
4	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	30kHz SSB SCS, 40MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
5	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex	30kHz SSB SCS, 40MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
6	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex	30kHz SSB SCS, 40MHz bandwidth, TDD duplex
	mode	for DL, SUL duplex mode for UL
7	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
8	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
9	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
10	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	30kHz SSB SCS, 40MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
11	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex	30kHz SSB SCS, 40MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
12	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex	30kHz SSB SCS, 40MHz bandwidth, FDD duplex
	mode	for DL, SUL duplex mode for UL
Note: The UE is o	only required to be tested in one of the supported test co	onfigurations

Table A.4.5.2.7.1-2: General test parameters for EN-DC interruptions at UL carrier RRC reconfiguration for NR SCell

Parameter	Unit	Test configuration	Value	Comment
RF Channel		Config	1 2 2	Three radio channels are
Number		1,2,3,4,5,6,7,8,9,10,11,12	1, 2,3	used for these three tests.
Active cell		Config 1,2,3,4,5,6,7,8,9,10,11,12	E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell3)	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 1,2,3,4,5,6,7,8,9,10,11,12	Normal	
DRX		Config 1,2,3,4,5,6,7,8,9,10,11,12	OFF	
Measurement gap pattern Id		Config 1,2,3,4,5,6,7,8,9,10,11,12	OFF	
SSB parameters			TBD	
SMTC parameters			TBD	
Filter coefficient		Config 1,2,3,4,5,6,7,8,9,10,11,12	0	L3 filtering is not used
T1	s	Config 1,2,3,4,5,6,7,8,9,10,11,12	5	
T2	S	Config 1,2,3,4,5,6,7,8,9,10,11,12	5	
T3	S	Config 1,2,3,4,5,6,7,8,9,10,11,12	5	

Table A.4.5.2.7.1 -3: NR Cell specific test parameters for EN-DC interruptions at UL carrier RRC reconfiguration for cell2

Parameter	Unit	Test	To	Test 1			Test 2		
		configuration	T1	T2	T3	T1	T2	Т3	

	1					1		
Frequency Range		Config 1,2,3,4,5,6,7,8,9,1 0,11,12	FR1				FR1	
PUSCH		Config	Г	TBD]			[TBD]	
parameters		1,2,3,4,5,6,7,8,9,1						
Parameters								
		0,11,12,7,8,9,10,1						
		1,12						
PUCCH		Config	Γ	TBD]			[TBD]	
parameters		1,2,3,4,5,6,7,8,9,1	_	•			-	
ļ ·		0,11,12						
PDSCH		Config 1,4,7,10	Q.P.	1.1 FDE)	C1	R.1.1 FD	חכ
parameters								
		Config 2,5,8,11		1.1 TDE			R.1.1 TE	
defined in A.3.1.1		Config 3,6,9,12		2.1 TDD			R2.1 TD	
CORESET		Config 1,4,7,10	CCR	.1.1 FD	D	CC	R.1.1 F	DD
parameters		Config 2,5,8,11	CCR	.1.1 TD	D	CC	R.1.1 T	DD
defined in A.3.1.3		Config 3,6,9,12		2.1 TDI			R2.1 TI	
EPRE ratio of		Cornig 5,0,9,12	001	2.1 10			JI\Z.1 11	<u> </u>
PSS to SSS	4							
EPRE ratio of								
PBCH_DMRS to								
SSS								
EPRE ratio of	1							
PBCH to								
PBCH_DMRS	-							
EPRE ratio of								
PDCCH_DMRS								
to SSS	dB	Config			0			
EPRE ratio of		1,2,3,4,5,6,7,8,9,1						
PDCCH to		0,11,12						
		0,11,12						
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 to OCNG								
DMRS								
_		Config		OD 4			OD 1	
OCNG Patterns		Config	,	OP.1			OP.1	
		1,2,3,4,5,6,7,8,9,1						
		0,11,12						
N_{oc} Note 2	dBm/15 KHz	Config			-10	2		
1 voc		1,2,3,4,5,6,7,8,9,1						
		0,11,12						
37	dBm/SCS	Config			-10	2		
N_{oc} Note 2	ubili/SCS				-10	_		
00		1,2,4,5,7,8,10,11						
		Config 3,6,9,12			-97	7		
SS-RSRP Note 3	dBm/SCS	Config	-86	-86	-86	-86	-86	-86
		1,2,4,5,7,8,10,11			1			
		Config 3,6,9,12	-83	-83	-83	-83	-83	-83
^ /	40			+				
\hat{E}_{s}/I_{ot}	dB	Config	16	16	16	16	16	16
s / ot		1,2,3,4,5,6,7,8,9,1						
		0,11,12		<u>L</u>	<u>L</u>	<u> </u>	<u></u>	<u></u>
\hat{E}_s/N_{oc}	dB	Config	16	16	16	16	16	16
$\mathbf{L}_{s}/\mathbf{IV}_{oc}$		1,2,3,4,5,6,7,8,9,1	=	-	1			-
Io ^{Note3}	dDres /O OOS 41 1	0,11,12	F7 ^	+	+		-	-
10,40160	dBm/9.36MHz	Config	-57.9					
		1,2,4,5,7,8,10,11		57.9	57.9	57.9	57.9	57.9
	dBm/38.16M	Config 3,6,9,12	-51.8	-	-	-	-	-
	Hz			51.8	51.8	51.8	51.8	51.8
Propagation					AWC			
Condition					, , , , , ,			
			i e					

- 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.4.5.2.7.1 -4: NR Cell specific test parameters for EN-DC interruptions at UL carrier RRC reconfiguration for cell3

Parameter	Unit	Test	T	Test 1			Test 2	
		configuration	T1	T2	T3	T1	T2	T3

		Config		FR1			FR1	
Frequency Range		1,2,3,4,5,6,7,8,9,1 0,11,12						
PUSCH parameters on		Config 1,2,3,4,5,6,7,8,9,1	[TBD]	[TB D]	[TB D]	[TB D]	[TB D]	[TB D]
NR UL carrier		0,11,12	(TDD)	_	_	_	-	-
PUCCH parameters on		Config 1,2,3,4,5,6,7,8,9,1	[TBD]	[TB D]	[TB D]	[TB D]	[TB D]	[TB D]
NR UL carrier		0,11,12			_	_	-	-
PUSCH parameters on		Config 1,2,3,4,5,6,7,8,9,1	[TBD]	[TB D]	[TB D]	[TB D]	[TB D]	[TB D]
supplementary		0,11,12		_	_	,	,	,
UL carrier PUCCH		Config	[TBD]	[TB	[TB	[TB	[TB	[TB
parameters on		1,2,3,4,5,6,7,8,9,1		D]	D]	D]	D]	D]
supplementary UL carrier		0,11,12						
PDSCH		Config	[TBD]	[TB	[TB	[TB	[TB	[TB
parameters defined in A.3.1.1		1,2,3,4,5,6,7,8,9,1 0,11,12		D]	D]	D]	D]	D]
CORESET		Config	[TBD]	[TB	[TB	[TB	[TB	[TB
parameters defined in A.3.1.3		1,2,3,4,5,6,7,8,9,1 0,11,12		D]	D]	D]	D]	D]
EPRE ratio of		-, -, -		1	ı			
PSS to SSS EPRE ratio of								
PBCH_DMRS to								
SSS EPRE ratio of								
PBCH to								
PBCH_DMRS EPRE ratio of								
PDCCH_DMRS	-ID	0 5 -			0			
to SSS EPRE ratio of	dB	Config 1,2,3,4,5,6,7,8,9,1			0			
PDCCH to		0,11,12						
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 to OCNG								
DMRS OCNG Patterns		Config	(DP.1			OP.1	
		1,2,3,4,5,6,7,8,9,1	·	J			0	
Note 2	dBm/15 KHz	0,11,12 Config			-10	2		
$N_{oc}^{}$ Note 2		1,2,3,4,5,6,7,8,9,1 0,11,12						
N_{oc} Note 2	dBm/SCS	Config 1,2,3,7,8,9	-102					
- voc		Config 4,5,6,10,11,12	-99					
SS-RSRP Note 3	dBm/SCS	Config 1,2,3,7,8,9	-86	-86	-86	-86	-86	-86
		Config 4,5,6,10,11,12	-83	-83	-83	-83	-83	-83
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config	16	16	16	16	16	16
s / ot		1,2,3,4,5,6,7,8,9,1 0,11,12						
\hat{E}_s/N_{oc}	dB	Config	16	16	16	16	16	16
s i · oc		1,2,3,4,5,6,7,8,9,1 0,11,12						

Io ^{Note3}		dBm/9.36MHz	Config 1,2,3,7,8,9	-57.9	-	-	-	-	-
					57.9	57.9	57.9	57.9	57.9
		dBm/38.16M	Config	-51.8	-	-	-	-	-
		Hz	4,5,6,10,11,12		51.8	51.8	51.8	51.8	51.8
Propagat	ion					AWC	3N		
Condition)								
Note 1:	The reso	urces for uplink to	ansmission are assig	ned to the	UE prio	r to the	start of	time pe	riod
	T2.								
Note 2:	te 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.4.5.2.7.2 Test Requirements

The UE shall be continuously scheduled in PSCell during the entire test. During the time duration T2 the UE shall not miss transmitting two consequtive ACK/NACK on PSCell. During the time duration T3 the UE shall not miss transmitting two consequtive ACK/NACK on PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.3 SCell Activation and Deactivation Delay

A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX 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 section 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.4.5.3.1-2 and cell-specific parameters in A. 4.5.3.1-3 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 section 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 $(m+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in section 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 section 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 section 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 CQI 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, 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 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 section 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	ms	TBD	the timing between DL data transmission and acknowledgement as specified in 38.321 [7]
T _{CSI_Reporting}	ms	[2]	the delay uncertainty in acquiring the first available CSI reporting resources as specified in 38.331 [2]
k	ms	TBD	As specified in section 4.3 of 38.213

Table A. 4.5.3.1.1-2: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Param	eter	Unit	Cell 2 T1 T2	T3	T1	Cell 3	_	T3
SSB ARFCN			freq1	10		freq1		10
	Config 1,4			F	DD			
Duplex mode	Config 2,3,5,6	1			DD			
	Config 1,4		Not Applicable					
TDD configuration	Config 2,5	 			onf.1.1			
· ·	Config 3,6	<u> </u>		TDDC	onf.1.2			
	Config 1,4		10: N _{RB,c} = 52					
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52					
	Config 3,6	<u> </u>		40: N _{RE}	_{B,c} = 106			
	Config 1,4			10: N _R	B,c = 52			
BWP BW	Config 2,5]		10: N _R	B,c = 52			
	Config 3,6	Ī [40: N _{RB,c} = 106					
DRx Cycle		ms		Not Ap	plicable			
DDCCH Deference	Config 1,4		SR.1.1 FDD			SR.1.1 FD	D	
PDSCH Reference measurement channel	Config 2,5]	SR.1.1 TDD			SR.1.1 TD	D	
measurement channel	Config 3,6	Ī [SR2.1 TDD			SR2.1 TD	D	
DMCI CODECET	Config 1,4		CR.1.1 FDD			CR.1.1 FD	D	
RMSI CORESET	Config 2,5	i	CR.1.1 TDD	CR.1.1 TDD		CR.1.1 TD	D	
Reference Channel	Config 3,6	i	CR2.1 TDD		CR2.1 TD		D	
	Config 1,4		CCR.1.1 FDI)		CCR.1.1 FI		
RMC CORESET	Config 2,5		CCR.1.1 TDI		CCR.1			
Reference Channel	Config 3,6		CCR.2.1 TDI			CCR.2.1 TI		
OCNG Patterns	y - 1				oattern 1			
SMTC configuration					TC.1	C.1		
	Config 1,2,4,5		SSB.1 FR1					
SSB configuration	Config 3,6	Ī [SSB.2 FR1					
PDSCH/PDCCH	Config 1,2,4,5	1.11=		15	kHz			
subcarrier spacing	Config 3,6	kHz			kHz			
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMR	S to SSS							
EPRE ratio of PBCH to PE								
EPRE ratio of PDCCH DM								
EPRE ratio of PDCCH to F		dB		(0			
EPRE ratio of PDSCH DM		<u> </u>						
EPRE ratio of PDSCH to F								
EPRE ratio of OCNG DMF	RS to SSS(Note 1)	4						
EPRE ratio of OCNG to O	CNG DIMRS (Note 1)				0.41			
$N_{oc}^{ m Note2}$		dBm/15kHz		[-1	04]			
$N_{oc}^{}$ Note2	Config 1,2,4,5			[-1	04]			
· oc	Config 3,6	dBm/SCS		[-101]				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB		[1	7]			
\hat{E}_s/N_{oc}		dB		[1	7]			
SS-RSRP ^{Note3}	Config 1,2,4,5	dBm/SCS			37]			
	Config 3,6		[-84]					
SCH_RP Note 3		dBm/15 kHz	[-87]					
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: 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 a slot (m+k), or in a slot $(m+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}]+1)$ as defined in section 8.3 if the slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted or not 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 $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, $T_{activation_time}=[3ms+T_{SMTC_SCell}+2ms]$, as defined in section 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 section 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $(m+1+[T_{HARQ}])$ to $(m+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in section 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 section 8.3.

The interruption of PSCell shall not be more than the values specified for EN-DC in Section 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 section 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 in non-DRX for 320ms 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 section A.4.5.3.1.1. The supported test configurations are the same as defined in section A.4.5.3.1.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.4.5.3.2.2 Test Requirements

The test requirements defined in section A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [3ms+ T_{SMTC_MAX} + T_{SMTC_SCell} +2ms].

A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

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 section 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 section A.4.5.3.1.1. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1. 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 section 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+[$T_{HARQ}+3$ ms+ $T_{SSB_max}+T_{SMTC_duration}$]) as defined in section 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 section 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 section 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 CQI 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	Parameter Unit Value		Comment
T1	ms	[100]	During this time the PSCell shall be known and the SCell configured, but not detected.

A.4.5.3.1.2 Test Requirements

The test requirements defined in section A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [3ms+2* T_{SMTC_MAX} +2* T_{SMTC_SCell} +2ms] as defined in section 8.3.

A.4.5.4 UE UL carrier RRC reconfiguration Delay

A.4.5.4.1 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 section 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, Table A. 4.5.4.1-2, Table A. 4.5.4.1-3 and Table A. 4.5.4.1-4 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 2 is configured to UE. At the start of T2, a supplementary uplink of cell2 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: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
Note: The U	E is only required to be tested in one of the supported to	est configurations

Table A.4.5.4.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test	Value	Comment
RF Channel Number		configuration 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.4.5.4.1-3: 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	T1 T2 T3		T1	T2	T3	

		0 (4 0 0 4	I			I			
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	-	DD Conf.1	1	7	DD Conf.1.	1	
1 DD comigaration		Conf 7, 8, 9		DD Conf.2			DD Conf.2.		
		Conf 1, 2, 3					0: $N_{RB,c} = 5$		
DIA	N 41 1-			0: N _{RB,c} = 5					
BW _{channel}	MHz	Conf 4, 5, 6		0: $N_{RB,c} = 5$			0: N _{RB,c} = 5		
		Conf 7, 8, 9		$0: N_{RB,c} = 1$		40: N _{RB,c} = 106			
PDSCH reference		Conf 1, 2, 3		SR.1.1 FDI		SR.1.1 FDD			
measurement		Conf 4, 5, 6		SR.1.1 TDI)		SR.1.1 TDD)	
channel as defined in A.3.1.1		Conf 7, 8, 9		SR 2.1 TDI)	SR 2.1 TDD			
RMSI CORESET		Conf 1, 2, 3		CR.1.1 FDI))		
reference		Conf 4, 5, 6		CR.1.1 TDI)		CR.1.1 TDD)	
measurement		Conf 7, 8, 9		-			-		
channel as defined		00111 7 , 0 , 0		CR.2.1 TDI)		CR.2.1 TDD)	
in A.3.1.2				014.2.1 101	•		011.2.1 100	'	
RMC CORESET		Conf 1 2 2	CCR.1.1 FDD			CCR.1.1 FDI			
		Conf 1, 2, 3							
reference		Conf 4, 5, 6	(CR.1.1 TD	טי	(CCR.1.1 TDI	ט	
measurement channel as defined		Conf 7, 8, 9	(CCR.2.1 TD	D	C	CCR.2.1 TDI	D	
in A.3.1.3		Conf 1, 2, 3, 4,	00.4			00.4			
OCNG Pattern Note 1		5, 6, 7, 8, 9		OP.1			OP.1		
SSB configuration		Conf 1, 2, 3, 4, 5, 6		SSB.1 FR1	l		SSB.1 FR1		
		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		Conf 1, 2, 3, 4,	DLBWP.0.1			DLBWP.0.1			
configuration DL dedicated BWP		5, 6, 7, 8, 9 Conf 1, 2, 3, 4,							
configuration		5, 6, 7, 8, 9		DLBWP.1.1			DLBWP.1.1		
UL dedicated BWP		Conf 1, 2, 3, 4,		ULBWP.1.	1	ULBWP.1.1			
configuration		5, 6, 7, 8, 9							
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		0							
PDCCH_DMRS	dB	Conf 1, 2, 3, 4,		0			0		
EPRE ratio of		5, 6, 7, 8, 9		-					
PDSCH_DMRS to									
SSS									
EPRE ratio of	1								
PDSCH to									
PDSCH_DMRS	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	-102			102			
	TORTIZ	Conf	-102		-102				
$N_{oc}^{}$ Note 2	dBm/			-102		-102			
	SCS	1,2,3,4,5,6		00			00		
		Conf 7,8,9	40	-99		-99 16 16 16			
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16	
S 1 OC	L	5, 6, 7, 8, 9	1						

$\hat{E}_{_{s}}/I_{_{ot}}$ 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/	Conf	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	9.36 MHz	1,2,3,4,5,6						
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: $\hat{E}_{_{s}}/I_{_{ot}}$, lo, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.5.4.1-4: 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	T3	T1	T2	Т3

Channel number		Conf 1, 2, 3, 4,	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.			TDDConf.1.1	
		Conf 3, 6, 9	TDDConf.2.			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			40: $N_{RB,c} = 100$	
PUSCH parameters		Conf 1, 4, 7	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A
for NR UL carrier		Conf 2, 5, 8	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A
		Conf 3, 6, 9	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A
PUCCH parameters		Conf 1, 4, 7	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A
For NR UL carrier		Conf 2, 5, 8	[TBD] [TBD]	[TBD]	N/A	[TBD]	N/A
DUCCII navamatara		Conf 3, 6, 9	[TBD] [TBD] N/A [TBD]	[TBD] N/A	N/A [TBD]	[TBD]	N/A [TBD]
PUSCH parameters		Conf 1, 4, 7				[TBD]	
for supplementary UL		Conf 2, 5, 8 Conf 3, 6, 9	N/A [TBD] N/A [TBD]	N/A N/A	[TBD] [TBD]	[TBD] [TBD]	[TBD] [TBD]
PUCCH parameters		Conf 1, 4, 7	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]
for supplementary		Conf 2, 5, 8	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]
UL		Conf 3, 6, 9	N/A [TBD]	N/A	[TBD]	[TBD]	[TBD]
PDSCH reference		Conf 1, 4, 7	SR.1.1 FD			SR.1.1 FDD	
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		00111 0, 0, 0	SR 2.1 TD	D		SR 2.1 TDD	
RMSI CORESET		Conf 1, 4, 7	CR.1.1 FD	D		CR.1.1 FDD	1
reference		Conf 2, 5, 8	CR.1.1 TD		CR.1.1 TDD		
measurement		Conf 3, 6, 9		GIAIII 133			
channel as defined		, ,	CR.2.1 TD	D	CR.2.1 TDD		
in A.3.1.2							
RMC CORESET		Conf 1, 4, 7	CCR.1.1 FI		CCR.1.1 FDI		
reference		Conf 2, 5, 8	CCR.1.1 TI	DD	(CCR.1.1 TDI)
measurement		Conf 3, 6, 9	000 0 4 75		000 0 4 TD	_	
channel as defined in A.3.1.3			CCR.2.1 TI	טט	CCR.2.1 TDD		
OCNG Pattern Note 1		Conf 1, 2, 3	OP.1		OP.1		
		Conf 1, 2, 4, 5,	SSB.1 FR	1		SSB.1 FR1	
SSB configuration		7,8					
		Conf 3, 6, 9	SSB.2 FR	1		SSB.2 FR1	
SMTC configuration		Conf 1, 2, 3, 4,	SMTC.1			SMTC.1	
DL initial BWP		5, 6, 7, 8, 9 Conf 1, 2, 3, 4,					
configuration		5, 6, 7, 8, 9	DLBWP.0.	.1		DLBWP.0.1	
DL dedicated BWP		Conf 1, 2, 3, 4,	DI DWD 4	4		DI DWD 4.4	
configuration		5, 6, 7, 8, 9	DLBWP.1.	1		DLBWP.1.1	
UL dedicated BWP		Conf 1, 2, 3, 4,	ULBWP.1.	1		ULBWP.1.1	
configuration		5, 6, 7, 8, 9	OLDWY.1.	1		OLDWI.I.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	dB	Conf 1, 2, 3, 4,	0	0			
EPRE ratio of		5, 6, 7, 8, 9					
PDCCH to							
PDCCH_DMRS							
EPRE ratio of							
PDSCH_DMRS to							
SSS FREE retio of							
EPRE ratio of							
PDSCH to PDSCH_DMRS							
I DOOLI_DIVING	l	I.					

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/ SCS	Conf 1, 2, 4, 5, 7,8	-102			-102		
	303	Conf 3, 6, 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/	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	SCS	Conf 3, 6, 9	-83	-83	-83	-83	-83	-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 Hote 2	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_{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.4.5.4.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within [20]ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within [20]ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within [20]ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within [20]ms 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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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, 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 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		Uni	Val	Comment	
		t	Test 1	Test 2	
Active F	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1, 4		FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD Configu	TDD Config 1, Configur 4		Not Applicable	Not Applicable	
ation	Config 2, 5		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3,		[TDDConf.1.2]	[TDDConf.1.2]	
CORES			[CR. 1.1 FDD]	[CR. 1.1 FDD]	
Referen		-	[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channe		-	[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1,		TBD (Note:	TBD (Note:	
Configu] [periodicity is 20ms)	periodicity is 20ms)	
ation	Config 2,		TBD (Note:	TBD (Note:	
	5		periodicity is 20ms)	periodicity is 20ms)	
	Config 3,		TBD (Note:	TBD (Note:	
	6		periodicity is 20ms)	periodicity is 20ms)	
SMTC Configu			FR1 patterm 1	FR1 patterm 1	
ation	Config 3, 6		FR1 patterm 2	FR1 patterm 2	
PDSCH PDCCH	U .		15 KHz	15 KHz	
subcarri r spacin	J ,		30 KHz	30 KHz	
csi-RS-I	ndex d as RLM RS		[0]	[0]	
	parameters		TBD	TBD	
CP leng			Normal	Normal	
Correlat Antenna	ion Matrix and		[2x2 Low]	[2x2 Low]	
Configu					
	DCI format		1-0	1-0	
Beam failure detect	Number of Control OFDM symbols		2	2	
ion trans	Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	0	0	
	energy				
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	

	REG bundle		6	6	
DRX	120		OFF	OFF	
Gap patte	n ID		[N.A.]	*[<i>gp0</i>]	
ssb-Index			2	2	Number of SSB indexes used for beam failure detection
rlmInSync Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thres	holdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCon S	rControlOffsetS		NA	NA	Used for deriving rsrp-ThresholdCSI-RS
beamFailu MaxCount	reInstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFailu Timer	reDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
ZP CSI-RS			TBD	TBD	
	nfiguration		TBD	TBD	
Periodic C	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]	
periodicit y			[10]	[10]	
T1	T1		1	1	During this time the the UE shall be fully synchronized to cell
T2		s	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

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 and To	est 2		Test 1 and Test 2				
			SSB of set q ₀					SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH	_beta	dB			4					4		
PDCCH	_DMRS_bet	dB			4					4		
а												
PBCH_b	eta	dB										
PSS_be	ta	dB										
SSS_be	ta	dB										
PDSCH	_beta	dB										
OCNG_I	oeta	dB	0					0				
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/	[-98]		[-98]							
1 oc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz	[-98]			[-98]						
Propaga condition				[TDL-0	C 300ns 1	100Hz]			[TDL-0	C 300ns 1	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 [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 2
rieid	Value
gapOffset	[0]

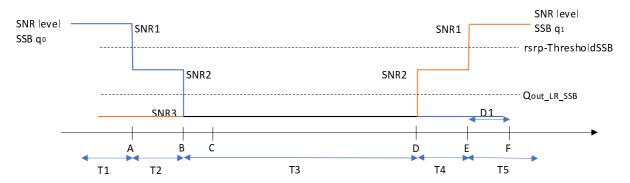


Figure A.4.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 2.

Table A.4.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	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 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

Parameter		Uni	Val	Comment	
		t	Test 1	Test 2	
Active F			Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1, 4	-	FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD Configu			Not Applicable	Not Applicable	
ation	Config 2, 5		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3,	-	[TDDConf.1.2]	[TDDConf.1.2]	
CORES			[CR. 1.1 FDD]	[CR. 1.1 FDD]	
Referen e		-	[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channe	Config 3,	-	[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1,		TBD (Note:	TBD (Note:	
Configu] [periodicity is 20ms)	periodicity is 20ms)	
ation	Config 2,		TBD (Note:	TBD (Note:	
	5]]	periodicity is 20ms)	periodicity is 20ms)	
	Config 3,		TBD (Note:	TBD (Note:	
	6		periodicity is 20ms)	periodicity is 20ms)	
SMTC Configu	Config 1, r 2, 4, 5		FR1 patterm 1	FR1 patterm 1	
ation	Config 3,		FR1 patterm 2	FR1 patterm 2	
PDSCH PDCCH	.		15 KHz	15 KHz	
subcarri r spacin	ie Config 3,		30 KHz	30 KHz	
csi-RS-I			[0]	[0]	
	parameters		TBD	TBD	
CP leng			Normal	Normal	
Correlat Antenna	tion Matrix and		[2x2 Low]	[2x2 Low]	
Configu	Tation I				
	DCI format		1-0	1-0	
Beam failure detect	Number of Control OFDM symbols		2	2	
ion trans	Aggregation level	CC E	8	8	
missio n param	Ratio of hypothetical PDCCH RE	dB	0	0	
eters	energy to average CSI-RS RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	

	REG bundle size		6	6	
DRX			640	640	
Gap patt	ern ID		[N.A.]	*[<i>gp0</i>]	
ssb-Inde			2	2	Number of SSB indexes used for beam failure detection
rlmInSyn Threshol	cOutOfSync d		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
•	esholdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCo S	erControlOffsetS		NA	NA	Used for deriving rsrp-ThresholdCSI-RS
beamFai MaxCour	lureInstance nt		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFai Timer	lureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
ZP CSI-F	-		TBD	TBD	
CSI-IM c	onfiguration		TBD	TBD	
Periodic	CSI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]	
periodicit y	periodicit Config 3, 6		[10]	[10]	
T1	T1		1	1	During this time the the UE shall be fully synchronized to cell 1
T2	-	S	0.4	0.4	
T3		s	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

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

Parameter		Unit	Test 1 and Test 2					Test 1 and Test 2					
			SSB of set q ₀						SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	
PDCCH	l_beta	dB			4					4			
PDCCH	I_DMRS_bet	dB			4					4			
а													
PBCH_I	beta	dB											
PSS_be	eta	dB											
SSS_be	eta	dB											
PDSCH	_beta	dB											
OCNG_	beta	dB			0					0			
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	Config 1	dBm/	[-98]				•	[-98]	•				
¹ voc	Config 2	15K			[-98]					[-98]			
	Config 3	Hz	z [-98] [-98]										
Propaga conditio			[TDL-C 300ns 100Hz]			[TDL-C 300ns 100Hz]							
Note 1:	OCNG shal	I be used	d such th	at the res	ources ir	Cell 1 aı	e fully all	located a	nd a cons	stant total	transmit	ted	

- 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.4.5.5.2.1-1.
- 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 [A.3.6].

Table A.4.5.5.2.1-4: Measurement gap configuration for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Field	Test 2
Field	Value
gapOffset	[0]

Table A.4.5.5.2.1-5: DRX-Configuration for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

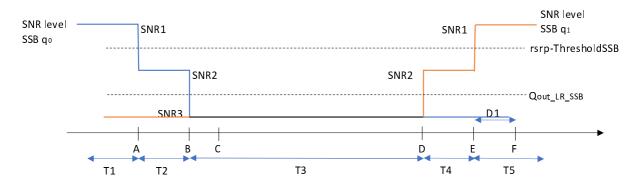


Figure A.4.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.4.5.5.3.1-3, A.4.5.5.3.1-4 and A.4.5.5.3.1-5 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.4.5.5.3.1-1 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 cel 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.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

Configuration	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 required to pass in one of the supported test configurations in FR1					

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		Uni	Val	Comment	
			Test 1	Test 2	
	Active PCell		Cell 1	Cell 1	
	RF Channel Number		1	1	
Duplex mode	Config 1, 4		FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD Configu	Config 1,		Not Applicable	Not Applicable	
ation	Config 2, 5		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3,	<u> </u>	[TDDConf.1.2]	[TDDConf.1.2]	
CORES			[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
Referen e	Config 2,		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channe			[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB Configu	Config 1,		SSB.1 FR1	SSB.1 FR1	A.3.10
ation	Config 2, 5		SSB.1 FR1	SSB.1 FR1	
	Config 3,		SSB.2 FR1	SSB.2 FR1	
SMTC Configu	Config 1, r 2, 4, 5		FR1 patterm 1	FR1 patterm 1	A.3.11
ation	Config 3,		FR1 patterm 2	FR1 patterm 2	
PDSCH PDCCH	.		15 KHz	15 KHz	
subcarri r spacin	ie Config 3,		30 KHz	30 KHz	
csi-RS-l	Index d as beam		[0]	[0]	
	parameters		TBD	TBD	A.3.2.1
CP leng	th		Normal	Normal	
Antenna			[2x2 Low]	[2x2 Low]	
Configu	DCI format		1-0	1-0	
	Number of		2	2	
Beam failure detect	Control OFDM symbols				
ion trans	Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	

	DMRS precoder granularity		REG bundle size	REG bundle size				
	REG bundle size		6 6					
DRX			OFF	OFF				
Gap patte	ern ID		[N.A.] 2	*[<i>gp0</i>]				
csi-RS-In			2	2	Number of SSB indexes used for beam failure detection			
Threshol	rlmInSyncOutOfSync Threshold				absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).	
·	esholdSSB		TBD	TBD	Threshold used for Q _{out_LR_SSB}			
powerCo S	verControlOffsetS		db0	db0	Used for deriving rsrp-ThresholdCSI-RS			
MaxCour			n2	n2	see TS 38.321 [7], section 5.17			
beamFail Timer	lureDetection		pbfd4	pbfd4	see TS 38.321 [7], section 5.17			
NZP CSI configura	-		[Resourceld 1]	[Resourceld 0]				
ZP CSI-R	RS		TBD	TBD				
	onfiguration		TBD	TBD				
	CSI reporting		PUCCH	PUCCH				
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]				
T -	periodicit Config 3,		[10]	[10]				
y		S	1	1	During this time the the UE shall be fully synchronized to cell 1			
T2		S	0.4	0.4				
T3		S	[TBD]	[TBD]				
D1		S	[0.24]	[0.44]				

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 U		Unit		Test	t 1 and T	est 2		Test 1 and Test 2				
				CSI-RS of set q₀				-RS of se				
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS												
EPRE ra	tio of PBCH SSS	dB										
	tio of PBCH	dB			0					0		
to PBCH												
EPRE ra		dB										
	DMRS to											
SSS												
EPRE ra		dB										
	to PDCCH											
DMRS EPRE ra	tio of	dB										
	DMRS to	uБ										
SSS	DIVING 10											
EPRE ra	tio of	dB										
	to PDSCH	u D										
DMRS												
EPRE ra	tio of OCNG	dB										
DMRS to	SSS ^(Note 1)											
	tio of OCNG	dB										
	DMRS (Note											
1)												
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
00	Config 2	15K Hz			[-98]					[-98]		
SS-	Config 3				[-98]					[-98]		
RSRP ^N		dBm /SC										
ote 3		S										
Ê _s /I _{ot}												
Ê _s /N _{oc}												
lo	config 1, 2	dBm/										
	, , ,	9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propaga				[TDLC300)]			[TDLC300)]	
condition			-ll- ()	- (1)		0-11.4						tl
Note 1:	OCNG shal	i pe use	a such th	at the res	sources ir	ı cell 1 al	re tuliv ali	ocated a	na a cons	stant total	transmit	tea

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.5.5.3.1-4: Measurement gap configuration for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 2			
rieid	Value			
gapOffset	[0]			

Table A.4.5.5.3.1-5: NZP-CSI-RS resource configuration for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Resourceld 0	Resourceld 1				
	Value	Value				
frequencyD omainAlloca tion ^{Note 1}	row1	row2				
startingRB	0	0				
nrofRBs	Note 2	Note 2				
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.5.1.7.1-1						

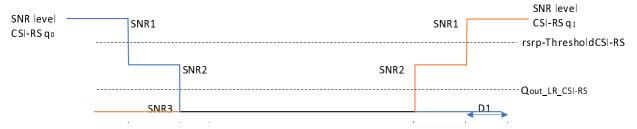


Figure A.4.5.5.3.1-1: SNR variation SSB for CSI-rs-based beam failure detection and link recovery testing in non-DRX mode

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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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.4.5.1.4.1-1, A.4.5.1.4.1-2, A.4.5.1.4.1-3, A.4.5.1.4.1-4, A.4.5.1.4.1-5 and A.4.5.1.4.1-6 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.4.5.1.4.1-1 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.4.5.1.4.1-1 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

Configuration	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 required to pass in one of the supported test configurations in FR1					

Table A.4.5.1.1.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Uni	Val	Comment	
			Test 1	Test 2	
	Active PCell		Cell 1	Cell 1	
	RF Channel Number		1	1	
Duplex mode	Duplex Config 1, mode 4		FDD	FDD	
	Config 2, 3, 5, 6		TDD	TDD	
TDD Configu	Config 1,		Not Applicable	Not Applicable	
ation	Config 2,	<u> </u>	[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3,		[TDDConf.1.2]	[TDDConf.1.2]	
CORES			[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
Referen e	c Config 2,		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Channe	5 5 m	-	[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB Configu	Config 1,		SSB.1 FR1	SSB.1 FR1	A.3.10
ation	r 4 Config 2, 5	-	SSB.1 FR1	SSB.1 FR1	
	Config 3,	-	SSB.2 FR1	SSB.2 FR1	
SMTC Configu	Config 1,		FR1 patterm 1	FR1 patterm 1	A.3.11
ation	Config 3,	-	FR1 patterm 2	FR1 patterm 2	
PDSCH PDCCH	/ Config 1,		15 KHz	15 KHz	
subcarri r spacin	e Config 3,	-	30 KHz	30 KHz	
csi-RS-I	ndex d as beam		[0]	[0]	
	parameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	7.1.0.2.1
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Comiga	DCI format		1-0	1-0	
Beam failure detect	Number of Control OFDM symbols		2	2	
ion trans	Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	

	DMRS precoder granularity		REG bundle size	REG bundle size			
	REG bundle size						
DRX			640	640			
Gap patt	ern ID		[N.A.]	*[<i>gp0</i>]			
csi-RS-Ir			2	2	Number of SSB indexes used for beam failure detection		
Threshol	rlmInSyncOutOfSync Threshold				absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
·	esholdSSB		TBD	TBD	Threshold used for Q _{out_LR_SSB}		
powerCo S	erControlOffsetS		ntrolOffsetS db		db0	db0	Used for deriving rsrp-ThresholdCSI-RS
MaxCou			[n2]	[n2]	see TS 38.321 [7], section 5.17		
beamFai Timer	lureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17		
NZP CSI configura			[Resourceld 1]	[Resourceld 0]			
ZP CSI-F	_		TBD	TBD			
CSI-IM c	onfiguration		TBD	TBD			
	CSI reporting		PUCCH	PUCCH			
CSI reporting	Config 1, 2, 4, 5	slot	[5]	[5]			
· ·	periodicit Config 3,		[10]	[10]			
y		S	1	1	During this time the the UE shall be fully synchronized to cell 1		
T2		S	0.4	0.4			
T3		S	[TBD]	[TBD]			
D1		S	[0.24]	[0.44]			

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Par	ameter	Unit	it Test 1 and Test 2				Test 1 and Test 2					
			CSI-RS of set q₀					RS of se				
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS												
	tio of PBCH	dB										
DMRS to					0					0		
	tio of PBCH	dB			0					0		
to PBCH		- E										
EPRE ra		dB										
SSS	DMRS to											
EPRE ra	tio of	dB										
	to PDCCH	ub										
DMRS	io i Doci i											
EPRE ra	tio of	dB										
	DMRS to	u.b										
SSS												
EPRE ra	tio of	dB										
PDSCH	to PDSCH											
DMRS												
	tio of OCNG	dB										
	SSS ^(Note 1)											
	tio of OCNG	dB										
	DMRS (Note											
1)		in.	TDD				TDD	TDD	TDD			TDD
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
oc .	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS- RSRP ^N		dBm										
ote 3		/SC S										
Ês/Iot		3										
Ês/Noc												
lo	config 1, 2	dBm/										
10	coming 1, 2	9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propaga	tion			1	TDLC300)]			Γ	TDLC300)]	
condition												
Note 1:	OCNG shal	I ha usar	d cuch th	at the rec	ources in		ro fully all	ocated a	nd a cons	tant tota	tranemit	tod

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.5.1.4.1-4: Measurement gap configuration for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Test 2		
rieid	Value		
gapOffset	[0]		

Table A.4.5.1.4.1-5: NZP-CSI-RS resource configuration for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Resourceld 0	Resourceld 1				
	Value	Value				
frequencyD omainAlloca tion ^{Note 1}	row1	row2				
startingRB	0	0				
nrofRBs	Note 2	Note 2				
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.5.1.7.1-1						

Table A.4.5.1.4.1-6: DRX-Configuration for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Fleid	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable



Figure A.4.5.1.4.1-1: SNR variation SSB 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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 delay

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 section 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 section 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 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 PSCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from 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* 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 PSCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from 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, 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 1:	The UE is only re	y required to be tested in one of the supported test configurations.		
Note 2:	A UE which fulfils	h 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 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]	
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

Param	eter	Unit	Cell 2
Frequency Range		1	FR1
Duplex mode Config 1,4			FDD
·	Config 2,3,5,6	1	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 BWP	Config 1,4		N
Configuration	Config 2,5		DLBWP.0.2 Note 4
	Config 3,6		
Active BWP-1	Config 1,4	_	Di Divido di Noto di
Configuration	Config 2,5	_	DLBWP.1.1 Note 4
	Config 3,6		
Active BWP-2	Config 1,4	_	DI DIAID A o Note 4
Configuration	Config 2,5	4	DLBWP.1.3 Note 4
BB001:5 (Config 3,6		00 4 4 505
PDSCH Reference	Config 1,4	4	SR.1.1 FDD
measurement channel	Config 2,5	4	SR.1.1 TDD
DMOLOODEOET	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4	4	CR.1.1 FDD
parameters	Config 2,5	4	CR.1.1 TDD
D II (LOODEOFT	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4	4	CCR.1.1 FDD
parameters	Config 2,5	-	CCR.1.1 TDD
OONO D-#	Config 3,6		CCR.2.1 TDD
OCNG Patterns	Config 1 2 4 E		OP.1 SSB.1 FR1
SSB Configuration	Config 1,2,4,5 Config 3,6	-	SSB.1 FR1 SSB.2 FR1
SMTC Configuration	Corning 5,0		SMTC.1
Correlation Matrix and	 ∆ntenna		1x2 Low
Configuration	Antonna		TAZ LOW
EPRE ratio of PSS to S	SSS	dB	0
EPRE ratio of PBCH D		1	
EPRE ratio of PBCH to		1	
EPRE ratio of PDCCH		1	
EPRE ratio of PDCCH		1	
EPRE ratio of PDSCH		1	
EPRE ratio of PDSCH	to PDSCH		
EPRE ratio of OCNG [MRS to SSS(Note		
1)	•		
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1)			
Noc ^{Note 2}	Config 1,2,4,5	dBm/SCS	[-104]
	Config 3,6		[-101]
N _{oc} Note 2		dBm/15kH z	[-104]
SS-RSRP Note 3	Config 1,2,4,5	dBm/SCS	[-87]
Config 3,6		1	[-90]
Ê _s /I _{ot}	,	dB	[17]
Ê _s /N _{oc}		dB	[17]
Io ^{Note3}	Operfice 4 0 4 5	dBm/	[-59]
	Config 1,2,4,5	9.36MHz	- 1
	Config 3,6	dBm/	[-61.9]
5	001g 0,0	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 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 TS 38.213 [3] section 12.

A.4.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in a slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in a 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-Switching Delay [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 Section 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 a 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 section 8.6, and interruption requirements for NR victim cell defined in section 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in TS36.133 section 7.32.2.7. 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 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 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 PSCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from 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,

Note 3:

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 PSCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from 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, 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 1:	The UE is only re	equired to be tested in one of the supported test configurations	
Note 2:	A UE which fulfils	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.	

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		I	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	ub	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2		Ŭ	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	32	ŭ	
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

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FF	₹1
Duplex mode Config 1,4			F	DD .
Config 2,3,5,6			TI	DD .
TDD configuration	Config 1,4		Not Ap	plicable
	Config 2,5			onf.1.1
	Config 3,6			onf.1.2
BW _{channel}	Config 1,4			N _{RB,c} = 52
onao.	Config 2,5			$N_{RB,c} = 52$
	Config 3,6			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		525W .G.E	32377 .0.2
Gormgaranori	Config 3,6			
Active BWP-0	Config 1,4		NA	DLBWP.0.2
Configuration	Config 2,5		IVA	DEBWY .O.2
Comiguration	Config 3,6			
Active BWP-1	Config 1,4		DLBWP.1.3	NA
Configuration	Config 1,4	1	DLDWF.1.3	INA
Comiguration		-		
Active BWP-2	Config 3,6		DLBWP.1.1	NA
	Config 1,4	-	DLBWP.T.T	INA
Configuration	Config 2,5			
PROOFF (Config 3,6		00.4	1 500
PDSCH Reference	Config 1,4			1 FDD
measurement channel	Config 2,5			1 TDD
	Config 3,6			1 TDD
RMSI CORESET	Config 1,4			1 FDD
parameters	Config 2,5			1 TDD
	Config 3,6			1 TDD
Dedicated CORESET	Config 1,4			.1 FDD
parameters	Config 2,5			.1 TDD
	Config 3,6			.1 TDD
OCNG Patterns				P.1
SSB Configuration	Config 1,2,4,5		SSB.	1 FR1
	Config 3,6		SSB.2 FR1	
SMTC Configuration			SMTC.1	
Antenna Configuration			1:	x2
Propagation Condition			AW	'GN
EPRE ratio of PSS to SSS		dB	0	0
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMR				
	EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH to PDSCH				
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	[-104]	[-104]
. •00		kHz	[-10 4]	[-10 4]
SS-RSRP Note 3	SS-RSRP Note 3		[-87]	[-87]
		dBm/15 kHz	[3,]	[5,]
Ê _s /I _{ot}		dB	17	17
Ê _s /N _{oc}		dB	17	17
Io ^{Note3}		dBm/	TBD	TBD
'	Config 1,2,4,5	9.36MHz	155	155
		dBm/	TBD	TBD
	Config 3,6	38.16MHz	. 35	. 35

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: 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.1.3 is linked with ULBWP.1.3 defined in TS 38.213 [3] section 12.

A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in a slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in a 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 TS36.133 Section 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 Section 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 a 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 section 8.6. 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 bandwidth part configuration BWP-2, 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 PSCell's slot (i+X) as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot (i+X+kI). The UE shall be continuously scheduled on PSCell's BWP-2 starting from slot (i+X).

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the RRC Reconfiguration message including BWP switch command is received till an ACK 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, 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 1: The UE is only required 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		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	
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]	

Table A.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
•	Config 2,3,5,6	1 1	TDD
TDD configuration	Config 1,4		Not Applicable
g	Config 2,5	1	TDDConf.1.1
	Config 3,6	1	TDDConf.1.2
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
= - Gridinio	Config 2,5	1	10 MHz: N _{RB,c} = 52
	Config 3,6	†	40 MHz: N _{RB,c} = 106
Active BWP ID			1. 2
Initial BWP	Config 1,4		DLBWP.0.2
Configuration	Config 2,5		
3	Config 3,6		
Active BWP-0	Config 1,4		NA
Configuration	Config 2,5	1	
Gormgaranor.	Config 3,6	1	
Active BWP-1	Config 1,4		DLBWP.1.3
Configuration	Config 2,5	1	DLDWI .1.5
Cornigaration	Config 3,6	-	
Active BWP-2	Config 1,4		DLBWP.1.1
Configuration	Config 1,4	1	DLBWF.I.I
Configuration		 	
PDSCH Reference	Config 3,6		SR.1.1 FDD
	Config 1,4	∮	
measurement channel	Config 2,5	╡	SR.1.1 TDD
DMOLOODEOET	Config 3,6		SR2.1 TDD
RMSI CORESET	Config 1,4	-	CR.1.1 FDD
parameters	Config 2,5	- -	CR.1.1 TDD
D # 1 10005505T	Config 3,6		CR2.1 TDD
Dedicated CORESET	Config 1,4	4	CCR.1.1 FDD
parameters	Config 2,5	4	CCR.1.1 TDD
00110.5	Config 3,6		CCR.2.1 TDD
OCNG Patterns	T =		OP.1
SSB Configuration	Config 1,2,4,5	_	SSB.1 FR1
	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS	5 to 555	-	
EPRE ratio of PDCCH DMF		 	
EPRE ratio of PDCCH to P		-	
EPRE ratio of PDSCH DMF		1	
EPRE ratio of PDSCH to PI			
EPRE ratio of OCNG DMRS		1	
EPRE ratio of OCNG to OC	` '		
Noc ^{Note 2}		dBm/15 kHz	[-104]
SS-RSRP Note 3		dBm/15 kHz	[-87]
Ês/Iot		dB	17
Ê _s /N _{oc}		dB	17
LoNote3		dBm/	TBD
-	Config 1,2,4,5	9.36MHz	-
0 " 0 0		dBm/	TBD
Note 1: OCNO shall b	Config 3,6	38.16MHz	
Note 1: OCNG shall b	e used such that bo	oth 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.

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 TS 38.213 [3] section 12.

A.4.5.6.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in a slot (i+X+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%.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, if there are no uplink resources for reporting the ACK in a slot (i+X+kI), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of X, k1 for type 1 and type 2 UE.

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, 10MHz bandwidth, FDD duplex mode	
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	
3		30 kHz SSB SCS, 40MHz 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 pattern 2	
		2	SMTC pattern 1	
		3	SMTC pattern 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 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		II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1		/A		/A	
		2		onf.1.1		TDDConf.1.1	
		3		onf.2.1	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 FDD	
RMC		2		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		P.1		P.1	
Intial BWP		1, 2, 3		WP.0	DLBWP.0		
configuration			ULBWP.0		ULBWP.0		
Active DL BWP		1, 2, 3	DLBWP.1		DLBWP.1		
configuration							
Active UL BWP		1, 2, 3	ULBWP.1		ULBWP.1		
configuration							
RLM-RS		1, 2, 3	SS	SB		SSB	
$N_{oc}^{}$ Note 2	dBm/SCS	1			-98		
oc		2			-98		
		3		-	-95		
N_{oc} Note 2	dBm/15 KHz	1			-98		
oc oc		2					
		3					
\hat{E}_{s}/I_{ot}	dB	1	4	-1.46	-Infinity	-1.46	
$\mathbf{L}_{s}/\mathbf{L}_{ot}$		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
L_s / I_{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	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-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

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.

Table A.4.6.1.2.2-1: Supported test configurations

С	onfiguration	Description				
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40MHz 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	Va	lue	Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Ce Cell 2	II 1 and NR	
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 2 3	SSB.1 FR1 SSB.1 FR1 SSB.2 FR1		
SMTC configuration		1 2 3	SMTC pattern SMTC pattern SMTC pattern	า 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	ms	1, 2, 3	40	640	
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	Се	Cell 2		II 3
		configuration	T1	T2	T1	T2
TDD configuration		1		/A		/A
		2		onf.1.1		onf.1.1
		3		onf.2.1	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 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	OI	P.1	OF	P.1
Intial BWP		1, 2, 3	DLB	WP.0	DLBWP.0	
configuration			ULBWP.0		ULBWP.0	
Active DL BWP		1, 2, 3	DLBWP.1		DLBWP.1	
configuration						
Active UL BWP		1, 2, 3	ULBWP.1		ULBWP.1	
configuration					SSB	
RLM-RS	ID (0.00	1, 2, 3	S	SB		SB
$N_{oc}^{}$ Note 2	dBm/SCS	1			-98	
		2			-98	
		3			·95	
$N_{oc}^{}$ Note 2	dBm/15 KHz	1		•	-98	
OC .		2	_			
		3				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
s / ot		2	_			
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
s i oc		2	4			
OO DODD Note 3	ID (000 KH	3	0.4	0.4	1 6 1	0.4
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94 04
lo.	dDm/0.26 MU=	3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1 2	-64.60	-62.25	-Infinity	-62.25
	dBm/9.36 MHz	3	-64.60	-62.25	-Infinity	-62.25
Dranagation	dBm/38.16 MHz		-58.50	-56.16	-Infinity	-56.16
Propagation Condition		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

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.4.6.1.2.1-3: DRX-Configuration for EN-DC intra-frequency event triggered reporting with gaps for TDD PSCell in FR1

Field	Test1	Test2	Comment
Field	Value	Value	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	Sf640	
shortDRX	disable	disable	

Table A.4.6.1.2.1-4: *TimeAlignmentTimer* -Configuration for EN-DC intra-frequency event triggered reporting with gaps for TDD PSCell in FR1

Field	Test1	Test2	Comment
rieiu	Value	Value	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

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

Configuration Description					
1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note: The UE is on	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 pattern 2	
		2	SMTC pattern 1	
		3	SMTC pattern 1	
CSI-RS parameters		1	TBD	
		2	TBD	
		3	TBD	
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 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	Ce	Cell 2		II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1		/A		/A	
		2		onf.1.1		TDDConf.1.1	
		3		onf.2.1	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 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	OI	P.1	OF	P.1	
Intial BWP		1, 2, 3		WP.0	DLBWP.0		
configuration			ULBWP.0		ULBWP.0		
Active DL BWP		1, 2, 3	DLBWP.2		DLBWP.1		
configuration							
Active UL BWP		1, 2, 3	ULBWP.1		ULBWP.1		
configuration							
RLM-RS		1, 2, 3	CSI	-RS		SSB	
N_{oc} Note 2	dBm/SCS	1			-98		
oc		2			-98		
		3			-95		
$N_{oc}^{}$ Note 2	dBm/15 KHz	1			-98		
- v oc		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
$\mathbf{L}_{\mathrm{s}}/\mathbf{L}_{\mathrm{ot}}$		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
\mathbf{L}_{s} / \mathbf{V}_{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	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16	
Propagation		1, 2, 3		A۷	VGN		
Condition							

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.

Table A.4.6.1.4.2-1: Supported test configurations

Co	nfiguration	Description			
	1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
	2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
	3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	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 configur		Val	lue	Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Cel Cell 2	II 1 and NR	
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 0	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 pattern		
		2	SMTC pattern		
		3	SMTC pattern	n 1	
CSI-RS parameters		1	TBD		
		2	TBD		
		3	TBD		
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	T	L3 filtering is not used
DRX	ms	1, 2, 3	40	640	
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.4.6.1.4.2-3: 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		TDDConf.2.1		
PDSCH RMC		1	SR.1.1 FDD		N/A		
configuration		2	SR.1.1 TDD		1		
		3	SR.2.	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	OP.1		OP.1		
Intial BWP		1, 2, 3	DLBWP.0		DLBWP.0		
configuration		1, 2, 0	ULBWP.0		ULBWP.0		
Active DL BWP		1, 2, 3	DLBWP.2		DLBWP.1		
configuration							
Active UL BWP		1, 2, 3	ULBWP.1		ULBWP.1		
configuration							
RLM-RS		1, 2, 3	CSI-RS		SSB		
$N_{\it oc}$ Note 2	dBm/SCS	1	-98 -98 -95				
		2					
		3					
$N_{\it oc}$ Note 2	dBm/15 KHz	1	-98				
		2	_				
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
	,	2	_				
	ID.	3	4	4	1 6 4	4	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
		2 3					
SS-RSRP Note 3	dBm/SCS KHz	<u> </u>	-94	-94	-Infinity	-94	
33-K3K7	UDIII/OUS NAZ	2	-94 -94	-94 -94	-Infinity	-94 -94	
		3	-9 4 -91	-9 4 -91	-Infinity	-94 -91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25	
10	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-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_{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.4.6.1.4.2-4: DRX-Configuration for EN-DC intra-frequency event triggered reporting with gaps for PSCell in FR1

Field	Test1	Test2	Comment
rieid	Value	Value	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	Sf640	
shortDRX	disable	disable	

Table A.4.6.1.4.2-5: *TimeAlignmentTimer* -Configuration for EN-DC intra-frequency event triggered reporting with gaps for PSCell in FR1

Field	Test1	Test2	Comment
rieiu	Value	Value	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

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, 10MHz bandwidth, FDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.					

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 pattern 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 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	Ce	II 2	Се	II 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	OP.1		OP.1	
Intial BWP		1	DLBWP.0		DLBWP.0	
configuration			ULBWP.0		ULBWP.0	
Active DL BWP		1	DLBWP.1		DLBWP.1	
configuration				MD 4	1 II DIA/D 4	
Active UL BWP		1	ULB	WP.1	ULBWP.1	
configuration		4	0.0	20	SSB	
RLM-RS	-ID: (0.00	1	58	SB)B
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	4 -1.46		-1.46
\hat{E}_s/N_{oc}	dB	1	4	4 4		4
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94 -94		-94
lo	dBm/9.36 MHz	1	-64.60 -62.25		-Infinity	-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 $N_{\rm ec}$ 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		Description		
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations.				

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 pattern 2	
CSI-RS parameters		1	TBD	
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 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	Ce	Cell 2		II 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		OP.1		P.1
Intial BWP		1	DLBWP.0		DLBWP.0	
configuration			ULBWP.0		ULBWP.0	
Active DL BWP		1	DLBWP.2		DLBWP.1	
configuration				MD 4		
Active UL BWP		1	ULB	WP.1	ULBWP.1	
configuration		4	001	D0	SSB	
RLM-RS	ID (0.00	1	CSI	-RS		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	4 -1.46		-1.46
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS KHz	1	-94 -94		-Infinity	-94
lo	dBm/9.36 MHz	1	-64.60 -62.25		-Infinity	-62.25
Propagation		1	AWGN			
Condition		<u> </u>				

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 $N_{\rm ec}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.6.3 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.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.

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

LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode					
LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode					
LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
LTE TDD, NR 30kHz SSB SCS, 40MHz 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.4.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati	Test 1	Test 2	
		on			
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 (PC	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	19	
offset		1,2,3,4,5,6			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		0	SSB.1 FR1		A
		Config 2,5	55B.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
		Comig o,c	000.21141		, to opening in place , i.e. re. i
A3-Offset	dB	Config	-6		
		1,2,3,4,5,6			
Hysteresis	dB	Config	0		
		1,2,3,4,5,6			
CP length		Config	Normal		
		1,2,3,4,5,6			
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			<u> </u>
Time offset between		Config 1,4	3ms		Asynchronous cells.
serving and neighbour					The timing of Cell 3 is 3ms later
cells		0			than the timing of Cell 2.
		Config	3µs		Synchronous cells.
		2,3,5,6			
T1	S	Config	5		
	_	1,2,3,4,5,6]		
T2	S	Config	TBD	TBD	
		1,2,3,4,5,6			

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 n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2,3,4,5,6		1	2		
Duplex mode		Config 1,4	FDD				
·		Config		TI	DD		
5,44		2,3,5,6					
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52 10: N _{RB,c} = 52				
		Config 2,5 Config 3,6			B,c = 52 B,c = 106		
BWP BW	MHz	Config 1,4			$_{B,c} = 100$		
		Config 2,5		10: N _R	_{B,c} = 52		
		Config 3,6			B,c = 106		
TDD configuration		Config 2,5		onf.1.1		Conf.1.1	
Initial DL BWP		Config 3,6 Config		onf.2.1 VP.0.1	טטו	Conf.2.1 NA	
IIIIIIai DE BWF		1,2,3,4,5,6	DLBV	VF.U. I		INA	
Dedicated DL BWP		Config	DLBV	VP.1.1		NA	
		1,2,3,4,5,6					
Dedicated UL BWP		Config	ULBV	VP.1.1		NA	
OCNG Patterns defined in		1,2,3,4,5,6 Config					
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	OI	P.1		OP.1	
PDSCH Reference		Config 1,4		1 FDD		-	
measurement channel		Config 2,5		1 TDD			
		Config 3,6		SR2.1 TDD			
CORESET Reference		Config 1,4		CR.1.1 FDD		-	
Channel		Config 2,5		1 TDD			
		Config 3,6	CR2.	CR2.1 TDD			
SMTC configuration defined in A.3.2.11.1 and A.3.2.11.2		Config 1,4	SMTC.2				
		Config 2,3,5,6	SMTC.1				
PDSCH/PDCCH subcarrier	kHz	Config		1	15		
spacing		1,2,4,5 Config 3,6			30		
EPRE ratio of PSS to SSS		Corning 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		Config	(0		0	
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6					
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		-98				
N_{oc}^{Note2}	dBm/S	Config	-98				
- ' oc	CS	1,2,4,5					
CC DCDD Note 3	4D: /O	Config 3,6	-95		04		
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
<u> </u>	dB	Config 3,6	-91 4	-91 4	-Infinity -Infinity	-88 7	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	UD	Config 1,2,3,4,5,6	4 4		-irilifility	/	

\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	-67.11	-67.11	-Infinity	-65.38
	dBm/38 .16MHz	Config 3,6	-62.27	-62.27	-Infinity	-61.06
Propagation Condition	.101/111/2	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 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.4.6.2.1.2 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 [TBD] 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 [TBD] 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.

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

Confi	ig	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 1: The	UE is only red	quired to be tested in one of the supported test configurations						
Note 2: targe	, ,							

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		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	ell 1 (Po	Cell) and	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			1 -		number 2.
Gap Pattern Id		Config	0		4		As specified in clause 9.1.2-1.
NA		1,2,3,4,5,6	00		40		
Measurement gap		Config	39		19		
offset SMTC-SSB parameters		1,2,3,4,5,6 Config 1,4	SSB.1	ED4			As specified in clause A.3.10.1
SWITC-SSB parameters		Coning 1,4	33B.1	FKI			As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		0	000.0	ED4			As an afficient in allows A O 40 4
		Config 3,6	SSB.2	FKT			As specified in clause A.3.10.1
A3-Offset	dB	Config	-6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
CP length		Config	Norma	al			
		1,2,3,4,5,6					
TimeToTrigger	S	Config	0				
Filter coefficient		1,2,3,4,5,6					LO filtaria a in catavand
Fliter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX	ms	Config	DRX	DRX	DRX	DRX	DRX is used
DKX	1115	1,2,3,4,5,6	.1	.2	.1	.2	DRA is used
Time offset between		Config	3 μs				Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	o pio				
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 3 is 3ms later
cells							than the timing of Cell 2.
		Config	3μs		_	Synchronous cells.	
		2,3,5,6					
T1	S	Config	5				
		1,2,3,4,5,6					
T2	s	Config	TBD	TBD	TBD	TBD	
		1,2,3,4,5,6					

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	Се	С	ell 3	
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1,2,3,4,5,6	,	1		2
Duplex mode		Config 1,4		F	-DD	
2 aprex mede		Config			TDD	
		2,3,5,6				
BW _{channel}	MHz	Config 1,4			I _{RB,c} = 52	
		Config 2,5			I _{RB,c} = 52	
BWP BW	MHz	Config 3,6 Config 1,4			$R_{B,c} = 106$ $I_{RB,c} = 52$	
	1411 12	Config 2,5			$I_{RB,c} = 52$	
		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 1,2,3,4,5,6	DLBV	VP.0.1		NA
Dedicated DL BWP		Config	DI BV	VP.1.1		NA
Bodioatoa BE BVVI		1,2,3,4,5,6	DLDV	*		
Dedicated UL BWP		Config	ULBV	VP.1.1		NA
		1,2,3,4,5,6				
OCNG Patterns defined in		Config				
A.3.2.1.1 (OP.1)		1,2,3,4,5,6		P.1	()P.1
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-
measurement channel		Config 2,5		SR.1.1 TDD		
0005057.0.7		Config 3,6		1 TDD		
CORESET Reference Channel		Config 1,4 Config 2,5	CR.1.1 FDD		-	-
Chaine		Config 2,5	CR.1.1 TDD CR2.1 TDD		1	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4		SMTC.2		
		Config 2,3,5,6	SMTC.1			
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 DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config	(0		0
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6				
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			
$N_{oc}^{}$ Note2	dBm/S	Config	-98			
· · oc	CS	1,2,4,5				
CC DCDD Note 3	4D /O	Config 3,6	0.4		-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
		Config 3,6	-91	-91	-infinity	-88

$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config	4	4	-Infinity	7
s / Tot		1,2,3,4,5,6				
\hat{E}_s/N_{oc}	dB	Config	4	4	-Infinity	7
L_s/V_{oc}		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	-67.11	-67.11	-Infinity	-65.38
	36MHz	1,2,4,5			_	
	dBm/38	Config 3,6	-62.27	-62.27	-Infinity	-61.06
	.16MHz				1	
Propagation Condition		Config		A\	WGN	
		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.

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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.4.6.2.3.1 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 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.4.6.2.3.1-1, A.4.6.2.3.1-2, and A.4.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.3.1-2 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.4.6.2.3.1-2 is provided for UE that support per-FR gap.

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.4.6.2.3.1-1.

Table A.4.6.2.3.1-1: 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, 10MHz bandwidth, FDD duplex	120 kHz SSB SCS, 100MHz					
	mode	bandwidth, TDD duplex					
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	mode					
	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	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.4.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati	Test 1	Test 2	
		on			
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		Cantin	LTE Call 4 (D)	Call) and ND	LTE Cell 1 is on E-UTRA RF
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Jell) and INK	channel number 1.
		1,2,3,4,3,0	Cell 2 (PSCell)		NR Cell 2 is on NR RF channel
					number 1.
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel
140igiiboui ooii		1,2,3,4,5,6	THE COM C		number 2.
Gap Pattern Id		Config	0	13	As specified in clause 9.1.2-1.
Cap i allolli ia		1,2,3,4,5,6			
Measurement gap		Config	39	39	
offset		1,2,3,4,5,6			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 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		Config	SSB.1 FR2		As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6			
offsetMO	dB	Config	6		
Lhistoria	4D	1,2,3,4,5,6	0		
Hysteresis	dB	Config	0		
a4-Threshold	dBm	1,2,3,4,5,6 Config	TBD		
a4-Tilleshold	ubili	1,2,3,4,5,6	100		
CP length		Config	Normal		
or longar		1,2,3,4,5,6	Norman		
TimeToTrigger	s	Config	0		
i iiii saa ii ii gga.		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		Config	2		than the timing of Cell 2.
		Config 2,3,5,6	3μs		Synchronous cells.
		2,3,3,0			
T1	S	Config	5		
	"	1,2,3,4,5,6	3		
T2	S	Config	TBD	TBD	
·-		1,2,3,4,5,6	.55	. 55	
L		, , - , - , - , -		l	1

Table A.4.6.2.3.1-3: 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		
NR RF Channel Number		Config 1,2,3,4,5,6	1	2		
Duplex mode		Config 1,4	FDD	TDD		
'		Config	TDD	TDD		
BW _{channel}	MHz	2,3,5,6 Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66		
DVV channel	IVII IZ	Config 1,4	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		
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				
		Config 3,6	TDDConf.2.1	TDDConf.3.1		
Initial DL BWP		Config	DLBWP.0.1	NA		
Dedicated DL BWP		1,2,3,4,5,6 Config	DLBWP.1.1	NA		
Boaloatoa BE BVVI		1,2,3,4,5,6	DLDWI .II.I	147		
Dedicated UL BWP		Config	ULBWP.1.1	NA		
		1,2,3,4,5,6				
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			
0.170		Config 3,6	CR2.1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2		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		_		
EPRE ratio of PSS to SSS		Config 3,6	30	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		Config	0	0		
PDCCH DMRS EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	J	Ĭ		
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)						
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	NA	TBD		
Relative difference in angle of		Config	NA	NA TBD		
arrival of cell 3 relative to cell 2	degrees	1,2,3,4,5,6				
N_{oc} Note2	dBm/15		NA	TBD		
oc	kHz					
	Note5					

N_{oc} Note2	dBm/S CS	Config 1,2,4,5	NA		٦	TBD	
	Note4	Config 3,6	N	IA	TBD		
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	-Infinity	TBD	
	Note5	Config 3,6	NA	NA	-Infinity	TBD	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD	
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-	
	dBm/38 .16MHz	Config 3,6	NA	NA	-	-	
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	-Infinity	TBD	
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 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.4.6.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.4.6.2.4 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.4.6.2.4.1 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 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.4.6.2.4.1-1, A.4.6.2.4.1-2, and A.4.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.4.1-2 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.4.6.2.4.1-2 is provided for UE that support per-FR gap.

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.4.6.2.4.1-1.

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.4.6.2.4.1-1: 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, 10MHz bandwidth, FDD duplex	120 kHz SSB SCS, 100MHz
	mode	bandwidth, TDD duplex
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	mode
	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 required to be tested in one of the supported test configuration	าร

Table A.4.6.2.4.1-2: 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		ell 1 (Po		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	ll 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6			1		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		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1		0 " 0 "	000 4				
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		0 " 00	000.0				
		Config 3,6	SSB.2	PR1			As specified in clause A.3.10.1
01470.000		0 "	000 4	ED 0			
SMTC-SSB parameters		Config	SSB.1	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					
offsetMO	dB	Config	6				
I best and all	-ID	1,2,3,4,5,6	0				
Hysteresis	dB	Config	U				
a4-Threshold	dBm	1,2,3,4,5,6	TBD				
a4-Trireshold	aBm	Config	IBD				
CP length		1,2,3,4,5,6 Config	Norma	- I			
CF length		1,2,3,4,5,6	NOITI	aı			
TimeToTrigger	S	Config	0				
Time rorngger	5	1,2,3,4,5,6	U				
Filter coefficient		Config	0				L3 filtering is not used
Filter coefficient		1,2,3,4,5,6	U				L3 lillering is not used
DRX		Config	DRX	DRX	DRX	DRX	DRX is used
DIX.		1,2,3,4,5,6	.1	.2	.1	.2	DIVI IS used
Time offset between		Config	3 μs	.2		٠.۷	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	υ μο				Synonionous Ely DO
Time offset between	<u> </u>	Config 1,4	3ms				Asynchronous cells.
serving and neighbour		Coming 1,1	Jilio			The timing of Cell 3 is 3ms later	
cells						than the timing of Cell 2.	
		Config	3μs			Synchronous cells.	
		2,3,5,6					
T1	s	Config	5				
		1,2,3,4,5,6					
T2	S	Config	TBD	TBD	TBD	TBD	
		1,2,3,4,5,6					

Table A.4.6.2.4.1-3: 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
NR RF Channel Number		Config	1	2
		1,2,3,4,5,6		
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
DVV channer	141112	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
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	TDDConf.1.1	TDDConr.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
Dedicated DL BWP		1,2,3,4,5,6 Config	DLBWP.1.1	NA
Dealoated DE DVVI		1,2,3,4,5,6	DLDVVF.I.I	ING
Dedicated UL BWP		Config	ULBWP.1.1	NA
		1,2,3,4,5,6		
OCNG Patterns defined in		Config		
A.3.2.1.1 (OP.1)		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 Config 3,6	CR.1.1 TDD CR2.1 TDD	
SMTC configuration defined in A.3.11.1 and A.3.11.2		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		
EDDE votio of DCC to CCC		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	2	
PDCCH DMRS		1,2,3,4,5,6	0	0
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)				
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3,4,5,6	NA	TBD
Relative difference in angle of		Config	NA	NA TBD
arrival of cell 3 relative to cell	degrees	1,2,3,4,5,6		
2				
$N_{oc}^{}$ Note2	dBm/15		NA	TBD
	kHz Note5			
	140160			1

$N_{oc}^{ m Note2}$	dBm/S	Config	NA		TBD	
	CS	1,2,4,5				
	Note4	Config 3,6	N	A		ΓBD
SS-RSRP Note 3	dBm/S	Config	NA	NA	TBD	TBD
	CS	1,2,4,5				
	Note5	Config 3,6	NA	NA	TBD	TBD
\hat{E}_{s}/I_{ot}	dB	Config	NA	NA	TBD	TBD
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1,2,3,4,5,6				
\hat{E}_s/N_{oc}	dB	Config	NA	NA	TBD	TBD
		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	NA	NA	-	-
	36MHz	1,2,4,5				
	dBm/38	Config 3,6	NA	NA	-	-
	.16MHz					
	dBm/95	Config	-	-	TBD	TBD
	.04	1,2,3,4,5,6				
	MHz					
	Note5					
Propagation Condition		Config		A۱	WGN	
		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 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.4.6.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.4.6.2.5 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.

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, 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 1: The UE is or	te 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: target NR ce	, ,						

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	Value			Comment
		configurati on	Test 1	Т	est 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 (P cell 2 (PScell)		nd NR	LTE Cell 1 is on E-UTRA RF channel number 1.
		1,2,3,4,5,6	cell 2 (PScell))		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 1,2,3,4,5,6	0	4		As specified in clause 9.1.2-1.
Measurement gap		Config	39	19		
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 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	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	3 μs			Synchronous EN-DC
Time offset between		1,2,3,4,5,6 Config 1,4	3ms			Asynchronous cells.
serving and neighbour		Joining 1,4	SITIS			The timing of Cell 3 is 3ms later
cells						than the timing of Cell 2.
55110		Config	3μs			Synchronous cells.
		2,3,5,6	ا ا			2,
T1	S	Config	5			
		1,2,3,4,5,6				
T2	s	Config	TBD	TBD		
		1,2,3,4,5,6				

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	Се	Sell 3		
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1,2,3,4,5,6	,	1		2
Duplex mode		Config 1,4			-DD	
- sp		Config	TDD			
		2,3,5,6				
BW _{channel}	MHz	Config 1,4			I _{RB,c} = 52	
		Config 2,5 Config 3,6			I _{RB,c} = 52 _{RB,c} = 106	
BWP BW	MHz	Config 1,4			$I_{RB,c} = 100$ $I_{RB,c} = 52$	
2 2		Config 2,5			$I_{RB,c} = 52$	
		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 1,2,3,4,5,6	DLBV	/P.0.1		NA
Dedicated DL BWP		Config	DLBW	/P.1.1		NA
		1,2,3,4,5,6	2231			· ·
Dedicated UL BWP		Config	ULBV	/P.1.1		NA
		1,2,3,4,5,6				
OCNG Patterns defined in		Config	0.1	5.4		ND 4
A.3.2.1.1 (OP.1) PDSCH Reference		1,2,3,4,5,6		P.1	(DP.1
measurement channel		Config 1,4	SR.1.1 FDD			-
measurement charmer		Config 2,5	SR.1.1 TDD		1	
CORESET Reference		Config 3,6 Config 1,4	SR2.1 TDD CR.1.1 FDD			
Channel		Config 1,4	CR.1.1 TDD		1	-
		Config 3,6	CR2.1 TDD		1	
SMTC configuration defined in A.3.2.11.1 and A.3.2.11.2		Config 1,4	SMTC.2			
		Config 2,3,5,6	SMTC.1			
PDSCH/PDCCH subcarrier	kHz	Config			15	
spacing		1,2,4,5				
EPRE ratio of PSS to SSS		Config 3,6	30			
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	()	0	
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6				
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			
Ŋ Note2	dBm/S	Config	-98			
$N_{oc}^{$	CS	1,2,4,5				
O D D D Nata 2		Config 3,6			-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
	03	1,2,4,5 Config 3,6	-91	-91	-Infinity	-88
		2 31.11.9 0,0	<u> </u>			

\hat{E}_{s}/I_{ot}	dB	Config	4	4	-Infinity	7
s / Tot		1,2,3,4,5,6				
\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7
L_s/V_{oc}		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	-67.11	-67.11	-Infinity	-65.38
	36MHz	1,2,4,5				
	dBm/38	Config 3,6	-62.27	-62.27	-Infinity	-61.06
	.16MHz					
Propagation Condition		Config		A'	WGN	
		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.

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 [TBD] 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 [TBD] 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.

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	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 1: The UE is only required to be tested in one of the supported test configurations							
Note 2: target NR cel							

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

E-UTRA RF Channel Number	Parameter	Unit	Test	Value			Comment	
E-UTRA RF Channel Number			configurati	Test	Test	Test	Test	
Number			_	1	2	3	4	
NR RF Channel Number	E-UTRA RF Channel					1		
Number 1,2,3,4,5,6 Used.								
Active cell Config 1,2,3,4,5,6 cell 2 (PScell) and NR channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 3 is on NR RF channel number 2.	NR RF Channel				1,	, 2		Two FR1 NR carrier frequencies is
1,2,3,4,5,6 cell 2 (PScell) channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 3 is on NR RF channel number 2. NR cell 3 is on NR RF channel number 2. NR cell 3 is on NR RF channel number 2. As specified in clause 9.1.2-1.	Number		1,2,3,4,5,6					used.
1,2,3,4,5,6 cell 2 (PScell) channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 2 is on NR RF channel number 1. NR Cell 3 is on NR RF channel number 2. NR cell 3 is on NR RF channel number 2. NR cell 3 is on NR RF channel number 2. As specified in clause 9.1.2-1.								
NR Cell 2 is on NR RF channel number 1.	Active cell						l NR	
Neighbour cell Config			1,2,3,4,5,6	cell 2 ((PScell)			
Neighbour cell								
1,2,3,4,5,6								
Config	Neighbour cell			NR ce	II 3			
1,2,3,4,5,6						1		
Measurement gap offset	Gap Pattern Id			0		4		As specified in clause 9.1.2-1.
offset 1,2,3,4,5,6 As specified in clause A.3.10.1 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 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 As specified in clause A.3.10.1 A3-Offset dB Config 1,2,3,4,5,6 Config 1,2,3,4,5,6 DRX ms Config 1,2,3,4,5,6 DRX								
Config 1,4 SSB.1 FR1 As specified in clause A.3.10.1				39		19		
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		Config 1,4	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 Hysteresis dB Config 0 1,2,3,4,5,6 CP length Config 1,2,3,4,5,6 TimeToTrigger s Config 1,2,3,4,5,6 Filter coefficient Config 1,2,3,4,5,6 DRX ms Config 1,2,3,4,5,6 DRX ms Config 1,2,3,4,5,6 Time offset between PCell and PSCell Config 1,2,3,4,5,6 Time offset between serving and neighbour cells Config 3 µs Synchronous cells. Config 3µs Synchronous cells. Config 3µs Synchronous cells.			Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
A3-Offset dB Config 1,2,3,4,5,6 Hysteresis dB Config 0 1,2,3,4,5,6 CP length Config 1,2,3,4,5,6 TimeToTrigger s Config 1,2,3,4,5,6 Filter coefficient Config 1,2,3,4,5,6 DRX ms Config 1,2,3,4,5,6 DRX ms Config 1,2,3,4,5,6 Time offset between PCell and PSCell Config 1,2,3,4,5,6 Time offset between serving and neighbour cells Config 3 µs Synchronous cells. Config 3µs Synchronous cells. Config 3µs Synchronous cells.								
1,2,3,4,5,6 Hysteresis dB Config 1,2,3,4,5,6 CP length Config 1,2,3,4,5,6 TimeToTrigger s Config 1,2,3,4,5,6 Filter coefficient Config 1,2,3,4,5,6 DRX ms Config DRX DRX DRX DRX DRX DRX s used Time offset between PCell and PSCell Time offset between serving and neighbour cells Config 3 μs Config 3μs Synchronous cells. Config 3μs Synchronous cells. Config Synchronous cells. Conf			Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
1,2,3,4,5,6 Hysteresis dB Config 1,2,3,4,5,6 CP length Config 1,2,3,4,5,6 TimeToTrigger s Config 1,2,3,4,5,6 Filter coefficient Config 1,2,3,4,5,6 DRX ms Config DRX DRX DRX DRX DRX DRX s used Time offset between PCell and PSCell Time offset between serving and neighbour cells Config 3 μs Config 3μs Synchronous cells. Config 3μs Synchronous cells. Config Synchronous cells. Conf	12.2%							
Hysteresis	A3-Offset	dB		-6				
1,2,3,4,5,6		in		_				
$ \begin{array}{ c c c c c } \hline \text{CP length} & & & & & & & \\ \hline \text{Config} & & & & & & \\ \hline \text{TimeToTrigger} & & & & & & \\ \hline \text{S } & & & & & \\ \hline \text{Config} & & & & & \\ \hline \text{Filter coefficient} & & & & \\ \hline \text{Config} & & & & \\ \hline \text{DRX} & & & & \\ \hline \text{ms} & & & & \\ \hline \text{Config} & & & & \\ \hline \text{1,2,3,4,5,6} & & \\ \hline \text{DRX} & & & \\ \hline \text{ms} & & & \\ \hline \text{Config} & & & \\ \hline \text{1,2,3,4,5,6} & & \\ \hline \text{Time offset between} & & & \\ \hline \text{PCell and PSCell} & & & \\ \hline \text{Time offset between} & & & \\ \hline \text{Serving and neighbour cells} & & & \\ \hline \text{Config} & & & \\ \hline \text{Synchronous cells.} & & \\ \hline \text{Config} & & & \\ \hline \text{Synchronous cells.} & \\ \hline \text{Config} & & \\ \hline \text{Synchronous cells.} & \\ \hline \end{array}$	Hysteresis	aB		0				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	OD In out to		1,2,3,4,5,6	NI				
$ \begin{array}{ c c c c c c c c } \hline TimeToTrigger & s & Config & 0 \\ \hline 1,2,3,4,5,6 & & & & & & L3 filtering is not used \\ \hline Filter coefficient & Config & 0 & & L3 filtering is not used \\ \hline DRX & ms & Config & DRX & DRX & DRX & DRX is used \\ \hline 1,2,3,4,5,6 & .1 & .2 & .1 & .2 \\ \hline Time offset between & Config & 3 μs & Synchronous EN-DC \\ \hline PCell and PSCell & 1,2,3,4,5,6 & & & Asynchronous cells. \\ \hline Time offset between serving and neighbour cells & Config 1,4 & 3ms & Asynchronous cells. \\ \hline Config & 3 μs & Synchronous cells. \\ \hline Config & 3 μs & Synchronous cells. \\ \hline Config & Synchronous cells. \\ \hline \hline Synchronous cells. \\ \hline \hline Config & Synchronous cells. \\ \hline \hline Synchronous cells. \\ \hline \hline Config & Synchronous cells. \\ \hline \hline Config & Synchronous cells. \\ \hline \hline \hline \end{tabular} $	CP length			Norma	di .			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	TimeTeTriager			0				
$ \begin{array}{ c c c c c c c c c } \hline Filter coefficient & Config & 0 & L3 filtering is not used \\ \hline DRX & ms & Config & DRX & DRX & DRX & DRX is used \\ \hline 1,2,3,4,5,6 & .1 & .2 & .1 & .2 \\ \hline Time offset between & Config & 3 μs & Synchronous EN-DC \\ \hline PCell and PSCell & 1,2,3,4,5,6 & & & Asynchronous cells. \\ \hline Time offset between serving and neighbour cells & Config 1,4 & 3ms & Asynchronous cells. \\ \hline Config & 3 μs & Synchronous cells. \\ \hline Config & 3 μs & Synchronous cells. \\ \hline Config & 3 μs & Synchronous cells. \\ \hline Config & Synchronous cells. \\ \hline \hline Config & Synchronous cells$	Time rorrigger	S		U				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Filter coefficient			0				L2 filtoring is not used
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Filler coefficient			U				L3 lillering is not used
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	DBY	mo		DBV	DBV	DBV	DBV	DRY is used
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	DRA	1115						DRA is used
PCell and PSCell 1,2,3,4,5,6 Time offset between serving and neighbour cells Config 1,4 Serving and neighbour cells The timing of Cell 3 is 3ms later than the timing of Cell 2. Config 3μs Synchronous cells. Synchronous cells.	Time offset between				.2	•	.2	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 3μs Synchronous cells.			3	3 μδ				Sylicilionous EN-DO
serving and neighbour cells The timing of Cell 3 is 3ms later than the timing of Cell 2. Config 3µs Synchronous cells.				3ms				Asynchronous cells
cells than the timing of Cell 2. Config 3μs Synchronous cells.			Joining 1,7	SITIS				
Config 3μs Synchronous cells.							than the timing of Cell 2.	
			Config	3us				Synchronous cells
			2,3,5,6	ομο				
			' ' ' '					
T1 s Config 5	T1	S	Config	5				
1,2,3,4,5,6								
T2 s Config TBD TBD TBD TBD	T2	S	Config	TBD	TBD	TBD	TBD	
1,2,3,4,5,6								

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	Sell 3		
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config	•	1		2
Duplex mode		1,2,3,4,5,6 Config 1,4				
Duplex mode		Config	TDD			
		2,3,5,6				
BW _{channel}	MHz	Config 1,4			$I_{RB,c} = 52$	
		Config 2,5			I _{RB,c} = 52	
BWP BW	MHz	Config 3,6 Config 1,4			$R_{B,c} = 106$ $I_{RB,c} = 52$	
	1011 12	Config 2,5			$I_{RB,c} = 52$	
		Config 3,6			_{RB,c} = 106	
OCNG Patterns defined in		Config	0.5			
A.3.2.1.1 (OP.1)		1,2,3,4,5,6		P.1	(DP.1
PDSCH Reference measurement channel		Config 1,4		1 FDD	_	-
measurement chainer		Config 2,5		1 TDD		
CORESET Reference		Config 3,6 Config 1,4	SR2.1 CR.1.			
Channel		Config 1,4		1 TDD	1	-
		Config 3,6	CR2.		1	
TDD configuration		Config 2,5			Conf.1.1	
		Config 3,6	TDDConf.2.1			
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1			
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1			
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1			
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1,4	SMTC.2			
		Config 2,3,5,6	SMTC.1			
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5 Config 3,6		15		
EPRE ratio of PSS to SSS		Corning 3,6			30	
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	()		0
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6				
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		-98			
N_{oc} Note2	dBm/S CS	Config 1,2,4,5	-98			
CC DCDD Note 3	4D: 'O	Config 3,6	0.4		-95	04
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88

$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config	4	4	-Infinity	7
Z _s / T _{ot}		1,2,3,4,5,6				
\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7
L_s/V_{oc}		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	-67.11	-67.11	-Infinity	-65.38
	36MHz	1,2,4,5				
	dBm/38	Config 3,6	-62.27	-62.27	-Infinity	-61.06
	.16MHz					
Propagation Condition		Config		Α	WGN	
		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.

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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.4.6.2.7.1 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.4.6.2.7.1-1, A.4.6.2.7.1-2, and A.4.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.7.1-2 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.4.6.2.7.1-2 is provided for UE that support per-FR gap.

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.4.6.2.7.1-1.

Table A.4.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	ig Description of serving cell Description of target cell						
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex	120 kHz SSB SCS, 100MHz					
	mode	bandwidth, TDD duplex					
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	mode					
	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	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	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.4.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		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 1,2,3,4,5,6	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 1,2,3,4,5,6	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	TBD				
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	TBD TBD				

Table A.4.6.2.7.1-3: 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 n	T1 T2	T1 T2
NR RF Channel Number		Config	1	2
Dominion		1,2,3,4,5,6	EDD	TDD
Duplex mode		Config 1,4 Config	FDD TDD	TDD TDD
		2,3,5,6	100	100
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
BW BW		Config 3,6	40: N _{RB,c} = 106	
BWP BW	MHz	Config 1,4 Config 2,5	10: N _{RB,c} = 52 10: N _{RB,c} = 52	100: N _{RB,c} = 66 100: N _{RB,c} = 66
		Config 2,5	40: N _{RB,c} = 106	· · · · · · · · · · · · · · · · · · ·
OCNG Patterns defined in		Config	10. TAKB,C — 100	100. 14KB,c = 00
A.3.2.1.1 (OP.1)		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	
TDD configuration		Config 3,6	CR2.1 TDD TDDConf.1.1	TDDConf.3.1
TDD configuration		Config 2,5		
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.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
SMTC configuration defined in A.3.11.1 and A.3.11.2		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		
EPRE ratio of PSS to SSS		Config 3,6	30	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		Config	0	0
PDCCH DMRS EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	O	
to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS		1		
to SSS(Note 1)]		
EPRE ratio of OCNG to				
OCNG DMRS (Note 1) UE orientation around TBD		Config	NA	TBD
axis and TBD axis	degrees	1,2,3,4,5,6	INA	טפו
Relative difference in angle of		Config	NA	NA TBD
arrival of cell 3 relative to cell 2	degrees	1,2,3,4,5,6		
N_{oc} Note2	dBm/15		NA	TBD
1 oc	kHz			
	Note5			

N_{oc} Note2	dBm/S CS	Config 1,2,4,5	NA		٦	ГВD
	Note4	Config 3,6	NA		7	ΓBD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	-Infinity	TBD
	Note5	Config 3,6	NA	NA	-Infinity	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	NA	NA	-Infinity	TBD
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-
	dBm/38 .16MHz	Config 3,6	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	-Infinity	TBD
Propagation Condition		Config 1,2,3,4,5,6		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 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.4.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.4.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.4.6.2.8.1 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.4.6.2.8.1-1, A.4.6.2.8.1-2, and A.4.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.8.1-2 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.4.6.2.8.1-2 is provided for UE that support per-FR gap.

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.4.6.2.8.1-1.

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.4.6.2.8.1-1: 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, 10MHz bandwidth, FDD duplex	120 kHz SSB SCS, 100MHz
	mode	bandwidth, TDD duplex
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex	mode
	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 required to be tested in one of the supported test configuration	ns

Table A.4.6.2.8.1-2: 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		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			Cell) and	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			1		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		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1							
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		0 " 00	000.0				
		Config 3,6	SSB.2	PR1			As specified in clause A.3.10.1
01470.000		0 "	000 4	ED 0			4 10 40 40 6
SMTC-SSB parameters		Config	SSB.1	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					
offsetMO	dB	Config	6				
Lhietarasia	٩D	1,2,3,4,5,6	0				
Hysteresis	dB	Config	U				
a4-Threshold	dBm	1,2,3,4,5,6	TBD				
a4-Titleshold	ubili	Config 1,2,3,4,5,6	טסו				
CP length		1,2,3,4,5,6 Config	Norma	- I			
CF length		1,2,3,4,5,6	INOITH	1 1			
TimeToTrigger	s	Config	0				
i illie to riiggei	5	1,2,3,4,5,6	U				
Filter coefficient		Config	0				L3 filtering is not used
Filter Coefficient		1,2,3,4,5,6	U				L3 littering is not used
DRX		Config	DRX	DRX	DRX	DRX	DRX is used
		1,2,3,4,5,6	.1	.2	.1	.2	DIA IS USEU
Time offset between		Config	3 μs	ı . <u>~</u>	• •	٠. ـ	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	Ο μο				J. I.S. II Oliodo El V DO
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour		,,,	5.7.15				The timing of Cell 3 is 3ms later
cells							than the timing of Cell 2.
		Config	3µs				Synchronous cells.
		2,3,5,6					
T1	s	Config	5				
		1,2,3,4,5,6					
T2	S	Config	TBD	TBD	TBD	TBD	
		1,2,3,4,5,6					

Table A.4.6.2.8.1-3: 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 n	T1 T2	T1 T2
NR RF Channel Number		Config	1	2
Duplex mode		1,2,3,4,5,6 Config 1,4	FDD	TDD
Buplex mede		Config	TDD	TDD
		2,3,5,6		
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5 Config 3,6	10: N _{RB,c} = 52 40: N _{RB,c} = 106	100: N _{RB,c} = 66 100: N _{RB,c} = 66
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 100	100: NRB,c = 66
5		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
OCNG Patterns defined in		Config	OD 4	OD 4
A.3.2.1.1 (OP.1) PDSCH Reference		1,2,3,4,5,6	OP.1	OP.1
measurement channel		Config 1,4	SR.1.1 FDD	-
moded of one of a mile.		Config 2,5 Config 3,6	SR.1.1 TDD 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	
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
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
SMTC configuration defined in A.3.11.1 and A.3.11.2		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		Cornig 5,0	30	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		Config		
PDCCH DMRS		1,2,3,4,5,6	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)				
UE orientation around TBD		Config	NA	TBD
axis and TBD axis	degrees	1,2,3,4,5,6		
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2,3,4,5,6	NA	NA TBD
	dBm/15		NA	TBD
$N_{oc}^{}$ Note2	kHz Note5			

N _{oc} Note2	dBm/S CS	Config 1,2,4,5	NA		-	TBD
	Note4	Config 3,6	NA		-	TBD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	TBD	TBD
	Note5	Config 3,6	NA	NA	TBD	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	NA	NA	TBD	TBD
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	NA	NA	-	-
	dBm/38 .16MHz	Config 3,6	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-	TBD	TBD
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 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.4.6.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.4.7 Measurement Performance requirements

A.4.7.1 SS-RSRP

A.4.7.1.1 intra-frequency case

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 Sections 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 section A.3.7.2.1 In all test cases, Cell 2 is the PSCell, and Cell 3 the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	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	required to be tested in one of the supported test configurations

Table A.4.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parame	otor	Unit	Test 1		Test 2		Test 3	
	eter .	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		freq1 freq1 fre					q1	
Duplex mode	Config 1,4 Config 2,3,5,6	_			TD			
	Config 1,4				Not App			
TDD configuration	Config 2,5	_			TDDC	onf.1.1		
	Config 3,6				TDDC	onf.2.1		
	Config 1,4				10: N _{RE}	_{B,c} = 52		
BW _{channel}	Config 2,5	MHz			10: N _{RE}	_{B,c} = 52		
	Config 3,6				40: N _{RB}	,c = 106		
Downlink initial BWP config	uration				DLB\	VP.0		
Downlink dedicated BWP co	onfiguration				DLB\	WP.1		
Uplink dedicated BWP confi		ULBWP.1						
DRX Cycle	ms			Not App	olicable			
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	-

				CD0.4		CD0 4		CD0 4	
		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 CORE Reference 0		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 Cha	nnel 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	
		Config 1,4		SSB 1.FR1		SSB 1.FR1		SSB 1.FR1	
SSB configu	ıration	Config 2,5		SSB 1.FR1	-	SSB 1.FR1	-	SSB 1.FR1	-
		Config 3,6		SSB 2.FR1		SSB 2.FR1		SSB 2.FR1	
SMTC confi	guration					SM			
OCNG Patte	erns	Config 1,2,4,5				OF	P.1		
PDSCH/PD		kHz			15	kHz			
subcarrier s	_	Config 3,6	10.12	30kHz					
	of PSS to SSS	. t- 000							
	of PBCH DMRS of PBCH to PB(
EPRE ratio	of PDCCH DMF	RS to SSS]						
EPRE ratio	of PDCCH to PI	DCCH DMRS	dB	0	0	0	0	0	0
	of PDSCH DMF								
	of PDSCH to PI	S to SSS(Note 1)	-						
		S to SSS(Note 1) SNG DMRS (Note 1)	1						
		NR_FDD_FR1_A,			1		1	1	1
		NR_TDD_FR1_A						-116	
		NR_FDD_FR1_B						-115.5 -115	
	Config	NR_TDD_FR1_C NR_FDD_FR1_D,	-					-1	15
	1,2,4,5	NR_TDD_FR1_D,		-10	06	-88		-11	4.5
	, , ,-	NR_FDD_FR1_E,	1						-
		NR_TDD_FR1_E							14
		NR_FDD_FR1_G							13
$N_{oc}^{ m Note2}$		NR_FDD_FR1_H NR_FDD_FR1_A,	dBm/15KhZ					-11	2.5
00		NR_FDD_FR1_A,	UDIII/ IONIIZ					-1	16
		NR_FDD_FR1_B	1						5.5
		NR_TDD_FR1_C]						15
	Config 3,6	NR_FDD_FR1_D,		-1	13	-9	94		4.5
	3,5	NR_TDD_FR1_D NR_FDD_FR1_E,	-		-]		-11	4.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	14
		NR_FDD_FR1_G]					-1	13
	NR_FDD_FR1_H							-11	2.5
Config 1,2,4,5			-10	06	-8	38		ie as I5kHz	
		NR_FDD_FR1_A,							
		NR_TDD_FR1_A							13
		NR_FDD_FR1_B							2.5
$N_{oc}^{ m Note2}$		NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/SCS					-1	12
	Config 3,6	NR_TDD_FR1_D		-1 ⁻	10	-9	91	-11	1.5
		NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-1	11
		NR_FDD_FR1_G NR_FDD_FR1_H	1						10 9.5
L	<u> </u>	MIX_1 PD_1 IX1_11	<u> </u>	<u> </u>		I		-10	· · · · ·

0.46

-5.76

-6

 \hat{E}_{s}/I_{ot}

2.5

-6

2.5

dΒ

\hat{E}_s/N_{oc}			dB	6	1	6	1	3	-1
SS-	Config 1,2,4,5	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H		-100	-105	-82	-87	-113 -112.5 -112 -111.5 -111 -110 -109.5	-117 -116.5 -116 -115.5 -115 -114 -113.5
RSRP ^{Note3}	Config 3,6	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-106	-109	-85	-90	-110 -109.5 109 -108.55 -108 -107 -106.5	-114 -113.5 -113 -112.5 -112 -111 -110.5
Io ^{Note3}	Config 1,2,4,5	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/ 9.36MHz	-70	.09	-52	.09	-81 -81 -80 -80	.26 .76 .26 .76 .26 .26
	Config 3,6	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H	dBm/ 38.16MHz	-70	.99	-51	-51.99		.16 .66 .16 .66 .16 .16
Propagation			=			AW			
Antenna cor						1x			
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 are time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.						·			

A.4.7.1.1.3 Test Requirements

port.

parameters themselves.

Note 3:

Note 4:

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in section 10.1.2.1.1 and relative requirement in section 10.1.2.1.2.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable

SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna

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 Sections 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, 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	y required to be tested in one of the supported test configurations

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 intra 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

Parameter	Config	nfia Unit	Test 1		Test 2	
Parameter	Coming	onfig Unit Cell 2 Cell 3		Cell 3	Cell 2	Cell 3

SSB ARFO	:N	1~6		freq1	freq2	freq1	freq2
00271111		1.4		10: N _{RB,c} =		10: N _{RB,c}	
BWchannel		2,5	MHz	10: N _{RB,c} =		10: N _{RB,c}	
= 11 onamici		3,6	1	40: N _{RB,c} =		40: N _{RB,c} :	
		1,4		FDD	100	FDD	
Duplex mo	de	2,5	1	TDD		TDD	
Duplex IIIo	ac	3,6	1	TDD		TDD	
		1,4		N/A		N/A	
TDD config	uration	2,5		TDDConf.1.1			
TDD comig	juration		-	TDDConf.1.1		TDDConf.1.1 TDDConf.2.1	
		3,6			.∠. ۱		1.2.1
PDSCH Re	eference	1,4		SR.1.1 FDD		SR.1.1 FDD	
measureme	ent channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
		3,6		SR.2.1 FDD		SR.2.1 FDD	
RMSI COR	ESET Reference	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
Channel		2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
Onamo		3,6		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated	CODESET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference		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 F	R1	SSB.1 F	R1
SSB config	uration	2,5	1	SSB.1 FI		SSB.1 F	
		3,6	1	SSB.2 FI		SSB.2 F	
OCNG Pat	terns	1~6		OP.1		OP.1	
DL BWP	terris	1~6		DLBWP.	1 1	DLBWP	
UL BWP		1~6		ULBWP.		ULBWP	
SMTC conf	figuration	1~6		SMTC.	1	SMTC.1	
EPRE ratio	of PSS to SSS						
EPRE ratio	of PBCH DMRS to						
SSS							
EPRE ratio	EPRE ratio of PBCH to PBCH						
DMRS							
	EPRE ratio of PDCCH DMRS to						
	SSS						
	of PDCCH to PDCCH	1~6	dB	0	0	0	0
DMRS	of PDSCH DMRS to	1~6	uБ	U	U	U	U
SSS	DI FDOCIT DIVING TO						
	of PDSCH to PDSCH						
DMRS	011 00011101 00011						
	of OCNG DMRS to						
SSS ^{Note 1}							
EPRE ratio of DMRS Note 1	of OCNG to OCNG						
·	NR_FDD_FR1_A,						TBD
	NR_TDD_FR1_A		1				
	NR_FDD_FR1_B		1				TBD
N_{oc} Note2	NR_TDD_FR1_C		JD //-	<u> </u>			TBD
N_{oc}	NR_FDD_FR1_D,	1~6	dBm/15	-94.65		TBD	TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,		kHz				
	NR_FDD_FR1_E,		1				TBD
	NR FDD FR1 G		1				TBD
	NR_FDD_FR1_H		1				TBD
	NR FDD FR1 A.						
	NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C		1				TBD
	NR_FDD_FR1_D,		1	-94.65		TDD	
			1			TBD	TBD
Nata							TBD
N_{oc}			dBm/SS				
			B SCS				TBD
	NR_FDD_FR1_H]				TBD
	NR_FDD_FR1_A,		1				TBD
	NR_TDD_FR1_A		1				
	NR_FDD_FR1_B	3,6		-91.65		TBD	TBD
	NR_TDD_FR1_C	-,-					TBD
	NR_FDD_FR1_D,						TBD
	NR_TDD_FR1_D	I	1			I	

	NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G						TBD
	$\begin{array}{c} \text{NR_FDD_FR1_H} \\ \hat{E}_s / I_{\text{ot}} \end{array}$	1~6	dB	10	10	TBD	TBD TBD
SS-	NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_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_H	1,2,4,5	dBm/SC	-84.65		TBD	TBD TBD TBD TBD TBD TBD TBD TBD
RSRPNote3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3,6	S	-81.65		TBD	TBD TBD TBD TBD TBD TBD TBD TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5	dBm/ 9.36MH	-56.28		TBD TBD TBD TBD	
Io ^{Note3}	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	1,2,1,0	Z	00.20		TBD TBD TBD	
IOraco	NR_FDD_FR1_A, NR_TDD_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	3,6	dBm/ 38.16M Hz	-50.19		TBD TBD TBD TBD TBD TBD TBD	
	NR_FDD_FR1_H \hat{E}_s/N_{oc}		dB	10	10	TBD TBD	TBD
	ation condition	1~6 1~6	-	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: 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.

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 section 10.1.4.1.1 and Relative requirement in section 10.1.4.1.2.

A.4.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.4.7.1.3.1 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 Sections 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.4.7.1.3.1-1.

Table A.4.7.1.3.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
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	120 kHz SSB SCS, 100MHz
4	LTE TDD, NR 15 kHz SSB SCS, 10MHz	bandwidth, TDD duplex mode
	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 L	JE is only required to be tested in one of the su	pported test configurations

A.4.7.1.3.2 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 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.4.7.1.3.2-1 and Table A.4.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.4.7.1.3.2-1 and Table A.4.7.1.3.2-2. The inter frequency measurements are supported by a measurement gap.

Table A.4.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Tes	st 1	Test 2	
			Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10:		10:	
			N _{RB,c} = 52	100:	N _{RB,c} = 52 10:	100:
BW _{channel}	2,5	MHz	N _{RB,c} = 52	$N_{RB,c} = 66$	N _{RB,c} = 52	$N_{RB,c} = 66$
	3,6					
			N _{RB,c} = 106		N _{RB,c} = 106	
Duplex mode	1,4 2,5		FDD TDD	TDD	FDD TDD	TDD
Duplex mode	3,6		TDD	וסטו	TDD	וטט
	1,4		N/A		N/A	
	2,5		TDDConf.	TDDConf.	TDDConf.	TDDConf.
TDD configuration	2,0		1.1	3.1	1.1	3.1
	3,6		TDDConf. 2.1		TDDConf. 2.1	
	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	
DMCI CODECET	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
Reference offarmer	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	-
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1,4		SSB.1 FR1		SSB.1 FR1	
SSB configuration			SSB.1	SSB.1	SSB.1	SSB.1
	2,5		FR1	FR2	FR1	FR2
	2.6		SSB.2		SSB.2	
	3,6		FR1		FR1	
OCNG Patterns	1~6		OF		OP.1	
DL BWP	1~6		DLBW		DLBW	
UL BWP	1~6		ULBW		ULBW	
SMTC configuration	1~6		SMT	ΓC.1	SMT	℃.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	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	1~6	_	Δ\Λ	I 'GN	AW	GN
Note 1: OCNG shall be	_	h that hath				

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.

Table A.4.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter		Config	Unit -	Т	est 1	Test 2		
		Coning		Cell 2	Cell 3	Cell 2	Cell 3	
N _{oc}	NR_FDD_FR1_A, NR_TDD_FR1_A		dBm/15				TBD	
Note2	NR_FDD_FR1_B	1~6	kHz	_	ΓBD	TBD	TBD	
	NR_TDD_FR1_C						TBD	

	NR_FDD_FR1_D, NR_TDD_FR1_D						TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD
	NR FDD FR1 H						TBD
	NR_FDD_FR1_A,						TBD
	NR_TDD_FR1_A NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C						TBD
	NR_FDD_FR1_D,	1,2,4,5		TBD		TBD	TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,	1,2,1,0		100		,,,,,	
	NR_TDD_FR1_E						TBD
N_{oc}	NR_FDD_FR1_G NR_FDD_FR1_H		dDm/CC				TBD TBD
Note2	NR_FDD_FR1_A,		dBm/SS B SCS		N/A		
	NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C NR_FDD_FR1_D,						TBD
	NR_TDD_FR1_D	3,6		TBD		TBD	TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G						TBD
	NR_FDD_FR1_H						TBD
	\hat{E}_{s}/I_{ot}	1~6	dB	TBD	TBD	TBD	TBD
	NR_FDD_FR1_A, NR_TDD_FR1_A						TBD
	NR_FDD_FR1_B						TBD
	NR_TDD_FR1_C NR_FDD_FR1_D,						TBD
	NR_FDD_FR1_D,	1,2,4,5		TBD		TBD	TBD
	NR_FDD_FR1_E,						TBD
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD
SS-	NR_FDD_FR1_H		dBm/SC		TBD		TBD
RSR PNote3	NR_FDD_FR1_A, NR_TDD_FR1_A		S		160		TBD
	NR_FDD_FR1_B					TBD	TBD
	NR_TDD_FR1_C						TBD
	NR_FDD_FR1_D,	3,6		TBD			TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,	•					TDD
	NR_TDD_FR1_E						TBD
	NR_FDD_FR1_G NR_FDD_FR1_H						TBD
	NR_FDD_FR1_H NR_FDD_FR1_A,					-	TBD
	NR_TDD_FR1_A						BD
	NR_FDD_FR1_B NR_TDD_FR1_C						BD BD
	NR_TDD_FR1_C NR_FDD_FR1_D,	1015	dBm/	N1/A			
	NR_TDD_FR1_D	1,2,4,5	9.36MH z	N/A			BD
	NR_FDD_FR1_E, NR_TDD_FR1_E		_			Т	BD
	NR_FDD_FR1_G						BD
	NR_FDD_FR1_H				TBD	Т	BD
	NR_FDD_FR1_A, NR_TDD_FR1_A					Т	BD
Io ^{Note3}	NR_FDD_FR1_B						BD
	NR_TDD_FR1_C		dBm/			Т	BD
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6	38.16M	N/A		Т	BD
	NR_FDD_FR1_E,		Hz			Т	BD
	NR_TDD_FR1_E NR_FDD_FR1_G						BD
	NR_FDD_FR1_H						BD
	NR_TDD_FR2_A						TBD
	NR_TDD_FR2_B	dBm/				TBD	
	NR_TDD_FR2_F NR_TDD_FR2_G	1~6	95.04M	N/A	TBD	N/A	TBD
	NR_TDD_FR2_G NR_TDD_FR2_T		Hz				TBD TBD
	····551\2_1		l		1		עטו ן

1	NR_TDD_FR2_Y						TBD		
\hat{E}_s/N_{oc}		1~6	dB	TBD	TBD	TBD	TBD		
Note 1:	Note 1: RSRP and lo levels have been derived from other parameters for information purposes.								
	They are not se	ettable par	ameters the	emselves.					
Note 2:	Note 2: RSRP minimum requirements are specified assuming independent interference and noise								
	at each receive	r antenna	port.						

A.4.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in section 10.1.5.1.1.

A.4.7.2 SS-RSRQ

A.4.7.2.1 Intra-frequency case

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 section 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

Table A.4.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
Farameter		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN			fre	eq1	fre	eq1	fre	q1		
Duplex mode	Config 1,4			•	FD	D				
	Config 2,3,5,6				TD					
	Config 1,4				Not App					
TDD configuration	Config 2,5				TDDCo					
	Config 3,6				TDDCo					
	Config 1,4				10: N _{RB}					
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52							
	Config 3,6				40: N _{RB,0}					
	Config 1,4		10: N _{RB,c} = 52							
BWP BW	Config 2,5			10: N _{RB,c} = 52						
	Config 3,6				40: N _{RB} ,	c = 106				
DRx Cycle	T	ms		T	Not App	licable	1			
	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			
ı	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			
Dedicated CORESET Reference Channel	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			
OCNG Patterns					OP.	1	•			
SS-RSSI-Measurement			Not Applicable							
STMC configruation					SMT					
	Config 1,2,4,5				SSB.1	FR1				
SSB configuration	Config 3,6				SSB.2	FR1				
PDSCH/PDCCH	Config 1,2,4,5				15 k	Hz				
subcarrier spacing	Config 3,6	kHz			30kl	Hz				
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)		dB	0	0	0	0	0	0		
NR_FDD_FR1_A, NR_TDD_FR1_B		dBm/15kH z	-91		[-110.05]		[-120] [-119.5] [-119] [-118.5] [-118] [-117] [-116.5]			

	Config 1,2,4	,5		-9	91	[-11	0.05]	Same for 1	
$N_{oc}^{$	Config 3,6	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-8	88	[-10	7.05]	[-1 [-11 [-1] [-1]	17] 6.5] 16] 5.5] 15]
\hat{E}_{s}/I_{ot}		NK_FDD_FRI_H	dB	-1.	.76	-4	l.7	[-11 -5.46	ა.ა <u>]</u> -5.46
\hat{E}_s/N_{oc}			dB	3	3	-2.9	-2.9	-4	-4
37 00		NR_FDD_FR1_A, NR_TDD_FR1_A						[-124]	[-124]
		NR_FDD_FR1_B NR_TDD_FR1_C				,		[- 123.5] [-123]	[- 123.5] [-123]
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D		-88	-88	[- 112.95]	[- 112.95]	[- 122.5]	[- 122.5]
	NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G						[-122] [-121]	[-122] [-121] [-	
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS					[- 120.5]	120.5]
e3		NR_FDD_FR1_A, NR_TDD_FR1_A						[-121]	[-121] [-
		NR_FDD_FR1_B NR_TDD_FR1_C		-85	-85	[- 109.95]	[- 109.95]	[- 120.5] [-120]	120.5] [-120]
	Config 3,6	NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,						[- 119.5]	[- 119.5]
		NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						[-119] [-118] [- 117.5]	[-119] [-118] [- 117.5
SS-RSRQ	Note3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-16.76	-16.76	[- 17.34]	[- 17.34]
Io ^{Note3}	Config 1,2,4,5	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G	dBm/ 9.36MHz	-5	56	[-:	79]	3-] 38-] 38-] 3-] 78-]	9] 3.5] 88] 7.5]

		NR_FDD_FR1_H						8-]	6]
	Config 3,6	NR_FDD_FR1_A, NR_TDD_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	dBm/ 38.16MHz	-50	0.00	[-7	73]	[81.	.91] .41] .91] 41]
		NR_FDD_FR1_H						[-79 AWG	AWG
Propagation condition		-	AWGN	AWGN	AWGN	AWGN	N	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_{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, 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.4.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 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, 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

Table A.4.7.2.2.2-1: SS-RSRQ Inter frequency test parameters

Parameter	Unit	Test 1		Test 2		Test 3		ĺ
Faranietei	Oilit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	l

SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1,4				FD			
•	Config 2,3,5,6				TD			
TDD configuration	Config 1,4				Not App TDDCo			
TDD configuration	Config 2,5							
	Config 3,6			TDDConf.2.1 10: N _{RB,c} = 52				
D.W.	Config 1,4							
BWchannel	Config 2,5	MHz			10: N _{RB}			
Config 3,6					40: N _{RB,0}			
	Config 1,4				10: N _{RB} ,			
BWP BW	Config 2,5	MHz			10: N _{RB} ,			
	Config 3,6				40: N _{RB,0}	= 106		
DRX Cycle		ms		T	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		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 Patterns					OCNG pa	attern 1		
SMTC configuration	Config 1,2,4,5				SMTC pa	attern 1		
Civit & configuration	Config 3,6				SMTC pa			
SSB configuration	Config 1,2,4,5 Config 3,6				SSB patteri SSB patteri			
PDSCH/PDCCH	Config 1,2,4,5				15 k			
subcarrier spacing	Config 3,6	kHz			30 k			
EPRE ratio of PSS to SSS	<u> </u>					· ·-		
EPRE ratio of PBCH DMRS								
EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMF								
EPRE ratio of PDCCH to PI	OCCH DMRS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PI								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OC								
	NR_FDD_FR1_A NR_TDD_FR1_A						TB	BD
	NR_FDD_FR1_B						TB	
0- "	NR_TDD_FR1_C	4D : /4 C ! ! !					TB	
$N_{oc}^{ m Note2}$ Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/15kH z	-80).18	TE	3D	TB	טי
1,4,7,0	NR_FDD_FR1_E NR_TDD_FR1_E	<u>-</u>					TB	BD
	NR_FDD_FR1_G						TB	
	NR_FDD_FR1_H						TB	טו

		NR_FDD_FR1_A							
		NR_TDD_FR1_A							
		NR_FDD_FR1_B							
		NR_TDD_FR1_C							
N_{oc} Note2	Config 3,6	NR_FDD_FR1_D	dBm/15kH	-86	.27				
oc oc	Joining 0,0	NR_TDD_FR1_D	Z	Z 00.27					
		NR_FDD_FR1_E							
		NR_TDD_FR1_E							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
		NR_FDD_FR1_A						TE	BD
		NR_TDD_FR1_A							
		NR_FDD_FR1_B						TE	
	Confin	NR_TDD_FR1_C						TE	
	Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D		-80	.18	TI	3D	TE	טפ
	1,2,4,5	NR_FDD_FR1_E						TE	חא
		NR_TDD_FR1_E						1.	טס
		NR FDD FR1 G						TE	RD.
37 11 0		NR_FDD_FR1_H						TE	
$N_{oc}^{ m Note2}$		NR_FDD_FR1_A	dBm/SCS					TE	
		NR_TDD_FR1_A	u2, 000						
		NR FDD FR1 B						TE	3D
		NR_TDD_FR1_C						TE	
	0 " 00	NR_FDD_FR1_D						TE	
	Config 3,6 NR_FDD_FR1_D NR_FDD_FR1_E			-83.27		TBD			
							TE	BD	
	NR_TDD_FR1_E NR_FDD_FR1_G								
								TE	3D
	NR_FDD_FR1_H							TE	3D
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	$\hat{\mathbf{E}}_{\epsilon}/\mathbf{I}_{\mathrm{ot}}$		dB	-1.	75	TI	BD	TBD	TBD
\hat{E}_s/N_{oc}			dB	-1.	75	TI	3D	TBD	TBD
5,7 00		NR FDD FR1 A							
37 00		NR_FDD_FR1_A NR_TDD_FR1_A						TBD	TBD
3,7 30		NR_TDD_FR1_A							
<i>y</i> , ce		NR_TDD_FR1_A NR_FDD_FR1_B						TBD	TBD
	Config	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C		04.00	04.00	TDD	TDD	TBD TBD	TBD TBD
3, 30	Config 1,2,4,5	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C		-81.93	-81.93	TBD	TBD	TBD	TBD
3, 00	Config 1,2,4,5	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D		-81.93	-81.93	TBD	TBD	TBD TBD	TBD TBD
3, 00		NR_TDD_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		-81.93	-81.93	TBD	TBD	TBD TBD TBD	TBD TBD TBD
		NR_TDD_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_FDD_FR1_G		-81.93	-81.93	TBD	TBD	TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD
SS-		NR_TDD_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_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-81.93	-81.93	TBD	TBD	TBD TBD TBD	TBD TBD TBD
		NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A	dBm/SCS	-81.93	-81.93	TBD	TBD	TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD
SS- RSRP ^{Not}		NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A	dBm/SCS	-81.93	-81.93	TBD	TBD	TBD TBD TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD TBD
SS- RSRP ^{Not}		NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B	dBm/SCS	-81.93	-81.93	TBD	TBD	TBD TBD TBD TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD TBD TBD
SS- RSRP ^{Not}		NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_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	dBm/SCS	-81.93	-81.93	TBD	TBD	TBD TBD TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_FR1_A 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_H NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D	dBm/SCS	-81.93 -85.02		TBD	TBD	TBD TBD TBD TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD TBD TBD
SS- RSRP ^{Not}		NR_TDD_FR1_A 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_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D	dBm/SCS		-81.93 -85.02			TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A 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_D NR_TDD_FR1_D	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A 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_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_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_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_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_D NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_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_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_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_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_C	dBm/SCS					TBD	TBD
SS- RSRP ^{Not}	1,2,4,5	NR_TDD_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_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_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_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B	dBm/SCS					TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_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_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B		-85.02	-85.02	TBD	TBD	TBD	TBD
SS- RSRP ^{Not}	1,2,4,5 Config 3,6	NR_TDD_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_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_A 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	dBm/SCS					TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A 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_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	TBD	TBD	TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A 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_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C 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_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D		-85.02	-85.02	TBD	TBD	TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A 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_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E		-85.02	-85.02	TBD	TBD	TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_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_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A 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_B NR_TDD_FR1_G NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E		-85.02	-85.02	TBD	TBD	TBD	TBD
SS-RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A 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_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E	dB	-85.02	-85.02	TBD	TBD	TBD	TBD
SS- RSRP ^{Not} e3	1,2,4,5 Config 3,6 Note3	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B	dB	-85.02	-85.02	TBD	TBD	TBD	TBD
SS-RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_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_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_FDD_FR1_B	dB	-85.02	-85.02 -14.77	TBD	TBD	TBD	TBD

		NR_TDD_FR1_C						TE	BD
		NR_FDD_FR1_D						TE	BD.
		NR_TDD_FR1_D							
		NR_FDD_FR1_E						TE	BD
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						TE	BD .
		NR_FDD_FR1_H						TE	BD
		NR_FDD_FR1_A						TE	BD
		NR_TDD_FR1_A							
		NR_FDD_FR1_B						TE	BD
		NR_TDD_FR1_C						TE	BD
	Config 3,6	NR_FDD_FR1_D	dBm/	_F	50	TF	3D	TBD	
	Coming 5,6	NR_TDD_FR1_D	38.16MHz	,	,0	''	JD		
		NR_FDD_FR1_E						TE	BD
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						TE	
		NR_FDD_FR1_H						TE	BD
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									

- 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, 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.4.7.4 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 Sections 9.5.2 and section 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.

Table A.4.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

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

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 GS		1~6	Onit	freq1	freq1
000 00	OIT	1,4		FDD	FDD
Duplex n	node	2,5	1	TDD	TDD
Duplox	nodo	3,6	1	TDD	TDD
		1,4		N/A	N/A
TDD Cor	nfiguration	2,5	1	TDDConf.1.1	TDDConf.1.1
100 001	ingulation	3,6	1	TDDConf.2.1	TDDConf.2.1
		1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BWchanne	ıl	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
DUSCH	Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
	ement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measure	anient channer	3,6		SR.2.1 TDD	SR.2.1 TDD
BWSI CO	ORESET Reference	1,4		CR.1.1 FDD	CR.1.1 FDD
Channel		2,5		CR.1.1 TDD	CR.1.1 TDD
Onamici		3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicate	ed CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
	ce Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
TOTOTOTIC	oo Onamoi	3,6		CCR.2.1 TDD	CCR.2.1 TDD
		1,4		SSB.3 FR1	SSB.3 FR1
SSB con	figuration	2,5		SSB.3 FR1	SSB.3 FR1
		3,6		SSB.4 FR1	SSB.4 FR1
OCNG P		1~6		OP.1	OP.1
DL BWP		1~6		DLBWP.1.1	DLBWP.1.1
UL BWP		1~6		ULBWP.1.1	ULBWP.1.1
	onfiguration	1~6		SMTC.1	SMTC.1
	of reported RS	1~6		2	2
L1-RSRI	P reporting period	1~6		TBD	TBD
	o of PSS to SSS o of PBCH DMRS to SSS				
EPRE ratio	o of PBCH to PBCH DMRS o of PDCCH DMRS to SSS o of PDCCH to PDCCH				
DMRS	0 01 PDCCH 10 PDCCH				
	o of PDSCH DMRS to SSS	1~6	dB	0	0
	o of PDSCH to PDSCH				
DMRS EPRE ratio	o of OCNG DMRS to				
SSSNote 1					
DMRS Note					
	NR_FDD_FR1_A, NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
λI	NR_TDD_FR1_C				TBD
N_{oc}	NR_FDD_FR1_D,	1.6	dDm/4EkUz	TDD	TDD
Note2	NR_TDD_FR1_D	1~6	dBm/15kHz	TBD	TBD
	NR_FDD_FR1_E, NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
A 7	NR_FDD_FR1_B		dBm/SSB		TBD
N_{oc}	NR_TDD_FR1_C	1,2,4,5	SCS	TBD	TBD
Note2	NR_FDD_FR1_D,	.,_, .,0			TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E,				TBD

	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR FDD FR1 A,				
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	26		TBD	TBD
	NR_TDD_FR1_D	3,6		טפו	וסטו
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				TBD
^ /	NR_FDD_FR1_H				TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~6	dB	TBD	TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	1,2,4,5		TBD	TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR TDD FR1 E		dBm/SSB SCS		TBD
	NR_FDD_FR1_G				TBD
SSB	NR_FDD_FR1_H				TBD
RSRP Note3	NR_FDD_FR1_A,				TDD
140100	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	3,6		TBD	TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,				TDD
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C		dBm/9.36		TBD
	NR_FDD_FR1_D,	1,2,4,5	MHz	TBD	TBD
	NR_TDD_FR1_D	.,_,,,		. 35	. 35
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G NR_FDD_FR1_H				TBD
lo Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	3,6	dBm/38.16	TBD	TBD
	NR_TDD_FR1_D	3,0	MHz	טטו	טטו
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD

\hat{E}_s/N_{oc}		1~6	1~6 dB		TBD
Propagation condition		1~6		AWGN	AWGN
Note 1:	OCNG shall be used s transmitted power spe				nt total
Note 2:				t specified in the test is odelled as AWGN of a	
	for N_{oc} to be fulfilled.				
Note 3:	RSRP and lo levels hat They are not settable			parameters for informa	ation purposes.
Note 4:	RSRP minimum requir at each receiver anten		specified assum	ning independent interf	erence and noise

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 sections 10.1.19.1.

Editor's Note: which reports are used to verify the accuracy is FFS A.4.7.4.2 CSI-RS based L1-RSRP

measurement

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 Sections 9.5.3 and section 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, 10MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz CSI-RS SCS, 10MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz CSI-RS SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz CSI-RS SCS, 10MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz CSI-RS SCS, 10MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz CSI-RS SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations

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 L1-RSRP measurement based on the CSI-RS resources 0 and 1. 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. Repetition is configured as TBD for the CSI-RS resource set.

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
P.W.		·	,	·
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	1	SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5	1	SR.1.1 TDD	SR.1.1 TDD
	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
	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4	4	CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5	4	CCR.1.1 TDD	CCR.1.1 TDD
	3,6	1	CCR.2.1 TDD	CCR.2.1 TDD
000 " "	1,4	-	SSB.1 FR1	SSB.1 FR1
SSB configuration	2,5	-	SSB.1 FR1	SSB.1 FR1
OONO Detterne	3,6		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~6		OP.1	OP.1
DL BWP	1~6		DLBWP.1.1	DLBWP.1.1
UL BWP	1~6 1~6		ULBWP.1.1 SMTC.1	ULBWP.1.1 SMTC.1
SMTC configuration				
CSI-RS 0	1,4 2,5	+	CSI-RS 1.2 FDD CSI-RS 1.2 TDD	CSI-RS 1.2 FDD CSI-RS 1.2 TDD
C31-R3 0	3,6	+	CSI-RS 2.2 TDD	
	1.4		CSI-RS 1.3 FDD	CSI-RS 2.2 FDD CSI-RS 1.3 FDD
CSI-RS 1	2,5	-	CSI-RS 1.3 TDD	CSI-RS 1.3 TDD
031-103 1	3,6	+	CSI-RS 2.3 TDD	CSI-RS 2.3 FDD
Number of reported RS	1~6		2	2
EPRE ratio of PSS to SSS	1110			
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	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,				TBD
NR_TDD_FR1_A]			
NR_FDD_FR1_B	[TBD
NR_TDD_FR1_C				TBD
Nation	1~6	dBm/15kHz	TBD	TBD
NR_TDD_FR1_D	1 0	GDIII/ TORTIZ		100
NR_FDD_FR1_E,				TBD
NR_TDD_FR1_E NR_FDD_FR1_G				TBD
NR_FDD_FR1_H				TBD
NR FDD FR1 A,				
NR_TDD_FR1_A				TBD
N_{oc} NR_FDD_FR1_B		dBm/CSI-RS		TBD
Note2 NR_TDD_FR1_C	1,2,4,5	SCS	TBD	TBD
NR_FDD_FR1_D,	i			
NR TDD FR1 D				TBD

	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR FDD FR1 A,				
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C	3,6	i		TBD
	NR_FDD_FR1_D,			TDD	
	NR_TDD_FR1_D			TBD	TBD
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
\hat{E}_{s}/I_{ot}		1~6	dB	TBD	TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	1,2,4,5		TBD	TBD
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E,				TBD
	NR_FDD_FR1_G				TBD
CSI-RS	NR_FDD_FR1_H		dBm/CSI-RS		TBD
RSRP Note3	NR_FDD_FR1_A,	3,6	SCS	TBD	
140165	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,				TBD
	NR_TDD_FR1_D				100
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E NR_FDD_FR1_G				TBD
	NR FDD FR1 H				TBD
	NR_FDD_FR1_A,				טסו
	NR_TDD_FR1_A			TDD	TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C		-ID /0.00		TBD
	NR_FDD_FR1_D,	1215	dBm/9.36		
	NR_TDD_FR1_D	1,2,4,5	MHz	TBD	TBD
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				TBD
lo Note3	NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A NR_FDD_FR1_B	3,6			TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,		dBm/38.16	TBD	
	NR_TDD_FR1_D		MHz		TBD
	NR_FDD_FR1_E,				TDD
_	NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD

\hat{E}_s/N_{oc}		1~6	dB	TBD	TBD
Propagat	Propagation condition			AWGN	AWGN
Note 1: OCNG shall be used s transmitted power spe					nt total
Note 2: Interference from othe constant over subcarri					
	for N_{oc} to be fulfilled.				
Note 3:	RSRP and lo levels hat They are not settable			parameters for informa	ation purposes.
Note 4: RSRP minimum requir		rements are		ning independent interf	erence and noise

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 sections 10.1.19.2.

Editor's Note: which reports are used to verify the accuracy is FFS

A.4.8 PSCell addition and release delay

A.4.8.1 Addition and Release Delay of known NR PSCell

A.4.8.1.1 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 section 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.4.8.1.1-1. 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.4.8.1.1-2 and cell-specific parameters in A.4.8.1.1-3 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.

Table A.4.8.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD			
2	LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD			
3	LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD			
4	LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD			
5	LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD			
6	LTE FDD, 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.4.8.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter		Unit	Value	Comment	
RF Channel N	umber		1, 2	Two radio channels are used for this test. One	
<u>.</u>		· ·		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 on RF channel number 2.	
A4	Hysteresis	dB	0	Hysteresis for evaluation of event A4.	
	Threshold	dBm	-93	Actual RSRP threshold for event A4. Needs to	
	RSRP			take absolute accuracy tolerance in section	
				9.1.11.1 into account plus margin.	
	Time to Trigger	S	0		
DRX			OFF	Continuous monitoring of primary cell	
Measurement	gap pattern Id		0	Gaps are configured before T2 and released	
				before T3.	
PRACH config	uration on cell2		FR1 PRACH	Captured in [A.3.8.2.1]	
			configuration		
			2		
	CQI/PMI periodicity and offset		TBD	CQI reporting for PSCell every uplink subframe	
configuration in			100		
	offset for cells on	dB	0	Individual offset for cells on primary component	
RF channel nu		ub_	Ů	carrier.	
	offset for cells on	dB	0	Individual offset for cells on carrier frequency of	
RF channel nu	ımber 2	u.b	ŭ	cell2.	
T1		s	5	During this time the PCell shall be known and	
			Ů	cell2 shall be unknown.	
T2		s	≤ 5	During this time the UE shall identify neighbour	
		S	,	cell (cell2) and report event A4.	
	T3		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.4.8.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter		Unit	Config		Test
E-UTRA RF			1,2,3,4,5,6	T1	<u>T2 T3 T4 T5 </u> 1
Channel Number NR RF Channel			1,2,0,1,0,0		·
Number			1,2,3,4,5,6		2
TDD			1,4		Not Applicable
configu	ration		2,5		TDDConf.1.1
			3,6		TDDConf.1.2
DVV		NAL 1-	1,4		10: N _{RB,c} = 52
BW _{chann}	el	MHz	2,5 3,6		10: N _{RB,c} = 52 40: N _{RB,c} = 106
	DL BWP		1,2,3,4,5,6		DLBWP.1.1
BWP	UL		1,2,3,4,5,6		ULBWP.1.1
PDSCH	BWP				SR.1.1 FDD
Referer			1,4		
measur			2,5		SR.1.1 TDD
channe			3,6		SR.2.1 TDD
RMSI C	ORESET		1,4		CR.1.1 FDD
Channe			2,5		CR.1.1 TDD
Dedicat	ad		3,6		CR.2.1 TDD CCR.1.1 FDD
CORES			1,4 2,5		CCR.1.1 TDD
Referer			3,6		CCR.2.1 TDD
Channe OCNG	el Patterns		1,2,3,4,5,6	OP.1	
SSB			1,2,4,5		SSB.1 FR1
configu	ration		3,6		SSB.2 FR1
SMTC			1,2,4,5		SMTC.1
configuration EPRE ratio of			3,6		SMTC.1
PSS to EPRE r PBCH t SSS EPRE r PBCH t DMRS EPRE r PDCCH to SSS EPRE r PDCCH EPRE r PDSCH to SSS EPRE r PDSCH to SSS EPRE r PDSCH TOCNG SSS(NO	atio of o PBCH atio of I DMRS to ote 1) atio of to OCNG	dB	1,2,3,4,5,6	0	
N_{oc} Note		dBm/15 kHz	1,2,3,4,5,6	5,6 N/A -85	
$N_{oc}^{ m Note}$	2	dBm/SCS	1,2,4,5	N/A	-85 -82
Ê ∕ı			3,6	N/A infinity	-82
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			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	

A.4.8.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 232 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]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2msWhere:$$

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 20 ms$

 $T_{search}\ =0$

 $T_{\Delta}=20ms$

 $T_{PSCell\ DU} = 16*10+10 = 170ms$

A.5 EN-DC tests with PSCell in FR2

- 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 section 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, 100MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100MHz 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.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

Paramet	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	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			SR3.1 TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SS	SS	dB		
EPRE ratio of PBCH_DN	MRS to SSS	dB		
EPRE ratio of PBCH to F	PBCH_DMRS	dB		
EPRE ratio of PDCCH_D	MRS 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				TBD	As defined in A.x.	
SSB with	$\frac{\hat{E}_s/I_{ot}}{N_{oc}}$ Config 1,2		dB	3	SSB with index 0 is signalled to be above	
index 0			dBm/15kHz	TBD	configured rsrp- ThresholdSSB	
	\hat{E}_s/N_{oc}	2	dB	3	Tillestiolassis	
	SS-RSF	RP Note 2	dBm/ SCS	TBD		
SSB with	\hat{E}_s/I_{ot}		dB	-17	SSB with index 1 is signalled to be below	
index 1	N_{oc}	Config 1,2	dBm/15kHz	TBD	configured rsrp- ThresholdSSB	
	\hat{E}_s/N_{oc}	2	dB	-17	Tillesholdssb	
	SS-RSF	RP Note 2	dBm/ SCS	TBD		
Io Note 1 Config 1,2		dBm	TBD	For symbols without SSB index 1		
ss-PBCH-BlockPower		dBm/ SCS	TBD	As defined in clause 6.3.2 in TS 38.331 [2].		
Configured l	JE transmit	ted power (dBm	TBD	As defined in clause	
$P_{ m CMAX, \ f,c}$)					6.2.4 in TS 38.101-2.	
PRACH Configuration				FR2 PRACH configuration 1	As defined in A.3.8.3.	
Propagation	Condition		-	AWGN		
Note 1: In level has been derived from other parameters for information purpose. It is not a settable par						

Note 1: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 2: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.5.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.5.3.2.2.1.2.4 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.5.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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 Subclause 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 Subclause 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 section 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 in FR1 needs to be tested by using the parameters in Table A.5.3.2.2.2.1-2 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.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, 100MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100MHz 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.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

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in	SSB pattern 1 in	As defined in A.3.10,
-	-		FR2	FR2	except of Number of SS
					per SS-burst and
					SS/PBCH block index
					below
Number of SSBs per SS	-burst		2	2	Different from the definit
					in A.3.10
SS/PBCH block index			0,1	0,1	Different from the definit
					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 parameters	Config 1,2		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1
Note 2					
NR RF Channel Number	7		1	1	
EPRE ratio of PSS to SS	SS	dB			
EPRE ratio of PBCH_DMRS to SSS		dB			
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_DMRS to SSS		dB	0	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB			
EPRE ratio of PDSCH_0	DMRS to SSS	dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB	7		

EPRE ratio of PDSCH to PDSCH_DMRS | dB | CONG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achiev 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

Parameter			Unit	Test-1	Test-2	Comments
AoA setup			TBD	TBD	As defined in A.x.	
SSB with	\hat{E}_s/I_{ot}		dB	3	3	SSB with index 0 is signalled to be above
index 0	N_{oc}	Config 1,2	dBm/15kHz	TBD	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	Tillesholdssb
	SS-RSR	P Note 2	dBm/ SCS	TBD	TBD	
SSB with	\hat{E}_s/I_{ot}		dB	-17	-17	SSB with index 1 is signalled to be below
index 1	N_{oc}	Config 1,2	dBm/15kHz	TBD	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	-17	Tillestiolassb
	SS-RSRP Note 2		dBm/ SCS	TBD	TBD	
lo Note 1			dBm	TBD	TBD	For symbols without St index 1
ss-PBCH-Bl	ockPower		dBm/ SCS	TBD	TBD	As defined in clause 6.: in TS 38.331 [2].
Configured UE transmitted power (dBm	TBD	TBD	As defined in clause 6.3	
$P_{ m CMAX, \ f,c}$)						in TS 38.101-2.
PRACH Configuration			FR2 PRACH	FR2 PRACH	As defined in A.3.8.3	
-			configuration 2	configuration 3		
Propagation	Condition		-	AWGN	AWGN	

Note 1: lo level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 2: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.5.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.5.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 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	TDD, SSB SCS 240 KHz, data SCS 120kHz, BW 100MHz	

For this test a single NR cell is used. Table A.5.4.1.1.1-2 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.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	Freq1	Freq1	
Duplex Mode		1	Т	DD	
TDD configuration		1	TDDC	onf.1.2	
BWchannel	MHz	1	100: NR	B,c = 66	
BWP BW	MHz	1	100: NR	B,c = 66	
DRx Cycle	ms	1	N/A	320 ^{Note5}	
PDSCH Reference measurement channel		1	SR.3.	1 TDD	
CORESET Reference Channel		1	CR.3.	1 TDD	
OCNG Patterns		1	OCNG p	oattern 1	
SMTC configuration		1	FR2 pa	attern 2	
PDSCH/PDCCH subcarrier spacing	kHz	1	1:	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 DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	1	0	0	
Note2	dBm/15 kHz	1	TBD	TBD	
N Note2	dBm/SCS	1	TBD	TBD	
$\hat{\mathbf{E}}_{\!\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\!\scriptscriptstyle \mathrm{ot}}$		1	3	3	
\hat{E}_s/N_{oc}		1	3	3	
SS-RSRP ^{Note3}	dBm/SCS	1	TBD	TBD	
Io ^{Note3}	dBm/95MHz	1	TBD	TBD	
Propagation condition		1	AW	GN	
SRS Config		1	Config1 ^{Note6}	Config2 ^{Note6}	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	enactral 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.

Note 5: DRx related parameters are given in Table A.5.4.1.1.1-4

Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	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	sl1	sl1	
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1	sl640	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.5.4.1.1.1-4: DRX-Configuration for UL Timing Tests.

Field	Test 2
rieid	Value
drx-onDurationTimer	TBD
drx-InactivityTimer	TBD
drx-RetransmissionTimerDL	TBD
drx-RetransmissionTimerUL	TBD
longDRX-CycleStartOffset	TBD
shortDRX	TBD

A.5.4.1.1.2 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.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 ($N_{TA} + N_{TA_offset}$) \pm T_e of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600 for FR1 and 13792 for FR2
 - 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

SCS of SSB signals (KHz) **Adjustment Value** Test1 Test2 +64*64Tc +32*64Tc 15 30 +32*64Tc +16*64Tc 120 +16*64Tc +8*64Tc 240 +8*64Tc +4*64Tc

Table A.5.4.1.1.2-1 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 Section 7.1.2 Table 7.1.2-3. This will only be done for Test1.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \pm T_e$ of the first detected path of DL SSB. For Test 2 and Test 4 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 and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in section 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 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, 100MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100MHz 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
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_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	$N_{TA_new} = N_{TA_old} + 8192 *T_c$ (based on equation in TS 38.213 [3] section 4.2)
T1	S	5	
T2	S	5	

Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1		
Parameter	Unit	T1	T2	
Duplex mode		TD	_	
TDD configuration		TDDCo	nf.3.1	
BW _{channel}	MHz	100: N _{RI}	$_{3,c} = 66$	
BWP BW	MHz	100: N _{RI}	$a_{c} = 66$	
DRx Cycle	ms	Not App	licable	
PDSCH Reference measurement channel		SR.3.1		
CORESET Reference Channel		CR.3.1	TDD	
OCNG Patterns		OCNG pa	attern 1	
SMTC configuration		SMTC.	1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120 k	kHz	
PUCCH/PUSCH subcarrier spacing	kHz	120 k	kHz .	
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	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)				
UE orientation around TBD axis and TBD	degrees	TB	D	
axis				
$N_{oc}^{}$ Note2	dBm/15kH	-98	3	
· oc	Z			
$N_{oc}^{}$ Note2		-89	9	
	dBm/SCS			
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	dB	3		
\hat{E}_s/N_{oc}	dB	3		
Io ^{Note3}	dBm/	-57.	96	
Propagation condition	95.04MHz	AWO	2N	
Note 1: OCNG shall be used such that both	aalla ara fullui			

Field Value Comment c-SRS 16 Frequency hopping is disabled b-SRS 0 b-hop 0 freqDomainPosition Frequency domain position of SRS 0 freqDomainShift 0 groupOrSequenceHopping neither No group or sequence hopping SRS-PeriodicityAndOffset Once every 5 slots sl5=0 SSB #0 is used for SRS path loss pathlossReferenceRS ssb-Index=0 estimation Non-codebook based UL transmission nonCodebook usage startPosition resourceMapping setting. SRS on last nrofSymbols symbol of slot, and 1symbols for SRS n1 repetitionFactor n1 without repetition. combOffset-n2 0

0

port1

transmissionComb setting

transmission

Number of antenna ports used for SRS

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

A.5.4.3.1.3 Test Requirements

Note:

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 slots after the reception of the timing advance command, where k = 24.

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%.

For further information see clause 6.3.2 in TS 38.331 [2].

A.5.5 Signaling characteristics

cyclicShift-n2

nrofSRS-Ports

A.5.5.1 Radio link Monitoring

In the following section, 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.

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 2.

Editor note: whether to revise power level to be gradually changed

Editor note: Further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level of the 2nd SSB

Editor note: AoA setting needs to be updated.

Editor note: test cases may need to be revised for 2 AoA

Table A.5.5.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The l	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	Test 2		
Active E-UTRA PO	Cell		Cell 1	Cell 1		
E-UTRA RF Chan	nel Number		1	1		
Active PSCell			Cell 2	Cell 2		
RF Channel Numb	er		2	2		
Duplex mode			TDD	TDD		
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]		
Configuration	Config 2		[TDDConf.3.1]	[TDDConf.3.1]		
CORESET	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
Reference Channel	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
SSB	Config 1		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]		
Configuration	Config 2		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]		
SMTC	Config 1		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
Configuration	Config 2	 	Table A.3.2.3.1-1	Table A.3.2.3.1-1		
PDSCH/PDCCH	Config 1		120 KHz	120 KHz		
subcarrier	Config 2		120 KHz	120 KHz		
spacing PRACH	Config 1		TBD	TBD		
Configuration	Config 2		TBD	TBD		
SSB index	Config 1		TBD	TBD		
assigned as RLM		<u> </u>				
RS	Config 2		TBD	TBD		
OCNG parameters	3		Table A.3.2.1.1-1	Table A.3.2.1.1-1		
CP length			Normal	Normal		
Correlation Matrix Configuration	and Antenna		[2x2 Low]	[2x2 Low]		
	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmission	Aggregation level	CCE	8	8		
parameters	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4	4		
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
REG bundle size			6	6		
DRX			OFF	OFF		
Gap pattern ID			[N.A.]	*[gp0]		
Layer 3 filtering			Enabled	Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		

N310	N310		1	1		
N311			1	1		
NZP CSI-RS con	figuration		TBD	TBD		
ZP CSI-RS config	guration		TBD	TBD		
CSI-IM configura	tion		TBD	TBD		
Periodic CSI repo	orting		PUCCH	PUCCH		
	T = -					
CSI reporting	Config 1	slot	[40]	[40]		
periodicity	Config 2		[40]	[40]		
NZP CSI-RS con	figuration		TBD	TBD		
ZP CSI-RS config	guration		TBD	TBD		
CSI-IM configura	tion		TBD	TBD		
T1			TBD	TBD		
T2		S	TBD	TBD		
T3		S	TBD	TBD		
D1		S	TBD	TBD		
Note 1: All configurations are assigned to the LIE 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.5.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Para	meter	Unit	Test 1				Test 2		
			T1	T2	T3	T1	T2	T3	
UE orientat TBD axis ar	ion around nd TBD axis	degrees	TBD			TBD			
PDCCH_be	eta	dB		4			4		
PDCCH_DI	MRS_beta	dB		4			4		
PBCH_beta	a	dB							
PSS_beta		dB							
SSS_beta		dB		0		0			
PDSCH_be	ta	dB							
OCNG_beta	а	dB							
SNR	Config 1	dB	[1]	[-7]	[-15]	[1]	[-7]	[-15]	
	Config 2		[1]	[-7]	[-15]	[1]	[-7]	[-15]	
N_{oc}		dBm/15 KHz	TBD			TBD TBD			
Propagation	n condition		[TI	DL-A 30ns 75	Hz]	[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 in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.5.5.1.1.1-1.

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.5.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

	Field	Test 2		
	rieiu	Value		
ga	pOffset	[0]		
s	E-UTRAN PCell and PSCell are SFN- synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with			

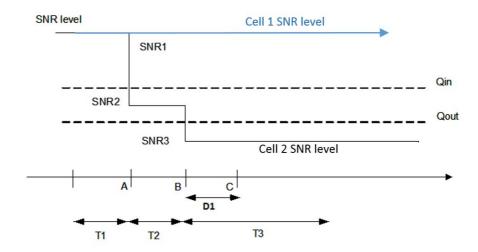


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

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 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.

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, A.5.5.1.2.1-3, and A.5.5.1.2.1-4 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 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 [5] ms. UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Editor note: whether to revise power level to be gradually changed

Editor note: further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level of the 2^{nd} SSB

Editor note: AoA setting needs to be updated.

Editor note: test cases may need to be revised for 2 AoA

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz 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	Test 2		
Active E-UTRA PCell			Ce1l 1	Cell 1		
E-UTRA RF Channel	Number		1	1		
Active PSCell			Cell 2	Cell 2		
RF Channel Number			2	2		
Duplex mode	10 " 1		TDD	TDD		
TDD Configuration	Config 1		[TDDConf.3.1]	[TDDConf.3.1]		
0005057	Config 2		[TDDConf.3.1]	[TDDConf.3.1]		
CORESET Reference Channel	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
SSB Configuration	Config 1		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]		
	Config 2		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]		
SMTC	Config 1		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
Configuration	Config 2		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
PDSCH/PDCCH	Config 1		120 KHz	120 KHz		
subcarrier spacing	Config 2		120 KHz	120 KHz		
PRACH	Config 1		TBD	TBD		
Configuration	Config 2		TBD	TBD		
SSB index assigned	Config 1		TBD	TBD		
as RLM RS	Config 2	-	TBD	TBD		
OCNG parameters			Table A.3.2.1.1-1	Table A.3.2.1.1-1		
CP length			Normal	Normal		
Correlation Matrix and Configuration	d Antenna		[2x2 Low]	[2x2 Low]		
In sync	DCI format		1-0	1-0		
transmission parameters	Number of Control OFDM symbols		2	2		
	Aggregation level	CCE	4	4		
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	0		
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	0		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
Out of sync	DCI format		1-0	1-0		
transmission parameters	Number of Control OFDM symbols		2	2		
	Aggregation level	CCE	8	8		
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4	4		

	T		Т .	
	Ratio of	dB	4	4
	hypothetical			
	PDCCH DMRS			
	energy to			
	average SSS			
	RE energy			
	DMRS precoder		REG bundle size	REG bundle size
	granularity			
	REG bundle		6	6
	size			
DRX			OFF	OFF
Gap pattern ID			[N.A.]	*[<i>gp0</i>]
Layer 3 filtering			Enabled	Enabled
T310 timer		ms	2000	2000
T311 timer		ms	1000	1000
N310			1	1
N311			1	1
NZP CSI-RS configu	ıration		TBD	TBD
ZP CSI-RS configura	ation		TBD	TBD
CSI-IM configuration			TBD	TBD
Periodic CSI reportir	ng		PUCCH	PUCCH
CSI reporting	Config 1	slot	[40]	[40]
periodicity	Config 2		[40]	[40]
NZP CSI-RS configu	NZP CSI-RS configuration		TBD	TBD
ZP CSI-RS configura			TBD	TBD
CSI-IM configuration			TBD	TBD
T1		S	TBD	TBD
T2		S	TBD	TBD
T3		S	TBD	TBD
T4		S	TBD	TBD
T5		S	TBD	TBD
D1		S	TBD	TBD

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. E-UTRAN is in non-DRX mode under test. Note 1:

Note 2:

Note 3:

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

Parai	meter	Unit			Test 1					Test 2		
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
UE orienta	tion around	degree			TBD					TBD		
TBD axis a	ind TBD	S										
axis												
PDCCH_b	eta	dB			4					4		
PDCCH_D	MRS_beta	dB			4					4		
PBCH_beta	а	dB										
PSS_beta		dB										
SSS_beta		dB			0					0		
PDSCH_be	eta	dB										
OCNG_bet	ta	dB										
SNR	Config 1	dB	[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
	Config 2		[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
N _{oc} dBm/15		TBD			TBD							
1 oc		KHz										
Propagatio	n condition			[TDL	-A 30ns	75Hz]			[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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.5.5.1.2.1-1.
- 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 section [A.3.6].

Table A.5.5.1.2.1-4: Measurement gap configuration for in-sync tests in non-DRX mode.

	Field	Test 2				
	Fleiu					
	gapOffset	[TBD]				
Note 1:	E-UTRAN PCell and PSCell are SFN- synchronous and frame boundary					
		aligned. (Ensure that RLM RS is partially overlapped with measurement gap).				

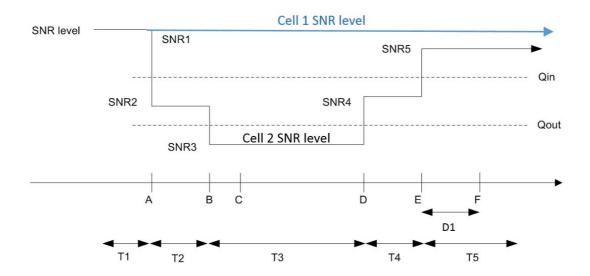


Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

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%.

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.

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, A.5.5.1.3.1-3, A.5.5.1.3.1-4, and A.5.5.1.3.1-5. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level of the 2nd SSB

Editor note: AoA setting needs to be updated.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration Description					
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz 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

Parameter			Unit	Value
				Test 1
Active E-UTRA PC				Ce1l 1
E-UTRA RF Chan	nel Num	ber		1
Active PSCell RF Channel Numb	<u> </u>			Cell 2
Duplex mode	er			TDD
TDD Configuration		Config 1		[TDDConf.3.1]
		Config 2		[TDDConf.3.1]
CORESET Refere	nce	Config 1		[CR. 3.1 TDD]
Channel		Config 2		[CR. 3.1 TDD]
SSB Configuration		Config 1		[Table A.3.2.2.2.1-1]
		Config 2		[Table A.3.2.2.2.1-1]
SMTC Configuration	on .	Config 1		Table A.3.2.3.1-1
3		Config 2		Table A.3.2.3.1-1
PDSCH/PDCCH		Config 1		120 KHz
subcarrier spacing		Config 2		120 KHz
PRACH Configura	tion	Config 1		TBD
		Config 2		TBD
SSB index assigne	ad as	Config 1		TBD
RLM RS	,u us	Config 2		TBD
00110		Corning 2		
OCNG parameters CP length	.			Table A.3.2.1.1-1 Normal
	and Ant	enna Configuration		[2x2 Low]
Corrolation Matrix	DCI fo			1-0
Out of sync		er of Control OFDM		2
transmission		gation level	CCE	8
parameters	Ratio	of hypothetical PDCCH ergy to average SSS	dB	4
	DMRS	of hypothetical PDCCH Senergy to average RE energy	dB	4
	DMRS	S precoder granularity		REG bundle size
	REGI	oundle size		6
DRX cycle				640
Gap pattern ID Layer 3 filtering				[N.A.] Enabled
T310 timer			ms	0
T311 timer N310			ms	1000 1
N311				<u>'</u> 1
	NZP CSI-RS configuration			TBD
ZP CSI-RS configuration				TBD
CSI-IM configuration				TBD
Periodic CSI repor	ting			PUCCH
CSI reporting		Config 1	slot	[40]
periodicity		Config 2		[40]
NZP CSI-RS config	guration			TBD
ZP CSI-RS configu	ıration			TBD

Note 5:

CSI-IM co	onfiguration		TBD		
T1		S	TBD		
T2		S	TBD		
T3		S	TBD		
D1		S	TBD		
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	.1.3.1-3: OTA	Unit		Test 1			
related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link			T1	T2	Т3		
	tests in DRX arameter						
UE orientation a	around TBD axis	degrees		TBD			
PDCCH_beta		dB		4			
PDCCH_DMRS	S_beta	dB		4			
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta	SSS_beta						
PDSCH_beta		dB					
OCNG_beta		dB		0			
SNR	Config 1	dB	[1]	[-7]	[-15]		
	Config 2		[1]	[-7]	[-15]		
N_{oc}		dBm/15 KHz	TBD				
Propagation co	ndition		[TDL-A 30ns 75Hz]				
trans	mitted power spec	ctral density is ac	hieved for all OFD				
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	•	•		R1, SNR2 and SN	R3 respectively in		

Table A.5.5.1.3.1-4: DRX-Configuration for out-of-sync tests

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].

Field	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-	[sl1]
RetransmissionTimerDL	
drx-	[sl1]
RetransmissionTimerUL	
longDRX-	[ms640]
CycleStartOffset	
shortDRX	disable

Table A.5.5.1.3.1-5: TimeAlignmentTimer -Configuration for out-of-sync testing

Field	Test1
rieid	Value
TimeAlignmentTimer	[Infinity]
periodicityAndOffset in	[sl40]
SchedulingRequestResourceConfig	[5140]

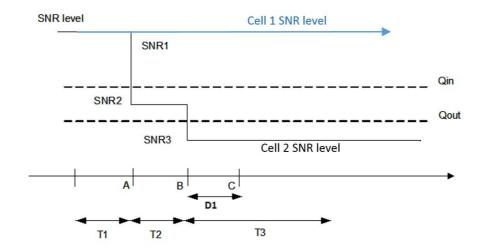


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

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 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.

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, A.5.5.1.4.1-3, A.5.5.1.4.1-4 and Table A.5.5.1.4.1-5. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level of the 2nd SSB

Editor note: AoA setting needs to be updated.

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, 100MHz bandwidth, TDD duplex mode				
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100MHz 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

	Param	eter	Unit	Value
	ı aramı	Cici	-	Test 1
Active E-UTRA E-UTRA RF C				Ce1l 1
Active PSCell	паппе	Number		Cell 2
RF Channel N	umber			2
Duplex mode		T		TDD
TDD Configura	ation	Config 1	-	[TDDConf.3.1]
CORESET		Config 2 Config 1		[TDDConf.3.1] [CR. 3.1 TDD]
Reference Cha	annel	ŭ .		
		Config 2		[CR. 3.1 TDD]
SSB Configura	ation	Config 1		[Table A.3.2.2.2.1-1]
		Config 2		[Table A.3.2.2.2.1-1]
SMTC		Config 1		Table A.3.2.3.1-1
Configuration		Config 2		Table A.3.2.3.1-1
PDSCH/PDCC		Config 1		120 KHz
subcarrier spa	cing	Config 2		120 KHz
PRACH		Config 1		TBD
Configuration		Config 2		TBD
SSB index ass	signed	Config 1		TBD
as RLM RS		Config 2		TBD
OCNG parame	eters			Table A.3.2.1.1-1
CP length Correlation Ma	atriy and	d Antonna		Normal
Configuration				[2x2 Low]
In sync	DCI fo			1-0 2
transmission parameters		per of Control M symbols		2
paramotoro		egation level	CCE	4
	PDCC	of hypothetical CH RE energy to ge SSS RE	dB	0
	energ	•		
	PDCC	of hypothetical CH DMRS energy erage SSS RE	dB	0
	DMR	S precoder		REG bundle size
	granu			6
Out of sync		bundle size ormat		<u>6</u> 1-0
transmission parameters	Numb	per of Control M symbols		2
		egation level	CCE	8
	Ratio PDC0 avera	Ratio of hypothetical PDCCH RE energy to average SSS RE		4
	Ratio PDC0	Ratio of hypothetical PDCCH DMRS energy to average SSS RE		4
DMR		S precoder larity		REG bundle size
		bundle size		6
DRX cycle			ms	40
Gap pattern ID				[N.A.]
Layer 3 filterin	g 			Enabled
NZP CSI-RS configuration				TBD

ZP CSI-RS configu	ration		TBD				
CSI-IM configuratio	n		TBD				
Periodic CSI reporti	ing		PUCCH				
CSI reporting	Config 1	slot	[40]				
periodicity	Config 2		[40]				
NZP CSI-RS config	uration		TBD				
ZP CSI-RS configu	ration		TBD				
CSI-IM configuratio	n		TBD				
T1		S	TBD				
T2		S	TBD				
T3		S	TBD				
T4		S	TBD				
T5		S	TBD				
D1		S	TBD				
period T	ote 1: All configurations are assigned to the UE prior to the start of time period T1.						
Note 3: E-UTRA	N is in non-DRX mode	under te	est.				

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

Par	ameter	Unit	Test 1						
			T1	T2	Т3	T4	T5		
UE orientation axis and TBD		TBD							
PDCCH_beta		dB			4				
PDCCH_DMF	RS_beta	dB			4				
PBCH_beta		dB							
PSS_beta		dB]						
SSS beta		dB]						
PDSCH_beta		dB	1						
OCNG_beta		dB	1		0				
SNR	Config 1	dB	[1]	[-7]	[-15]	[-4.5]	[1]		
	Config 2		[1]	[-7]	[-15]	[-4.5]	[1]		
N_{oc}		dBm/15 KHz			TBD				
Propagation of	ondition		[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 in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.5.5.1.4.1-1.
- 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 section [A.3.6].

Table A.5.5.1.4.1-4: DRX-Configuration for in-sync tests

Field	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-	[sl1]
RetransmissionTimerDL	
drx-	[sl1]
RetransmissionTimerUL	
longDRX-	[ms40]
CycleStartOffset	
shortDRX	disable

Table A.5.5.1.4.1-5: TimeAlignmentTimer -Configuration for in-sync testing

Field	Test 1
Field	Value
TimeAlignmentTimer	infinity
periodicityAndOffset in SchedulingRequestResourceConfig	[sl40]

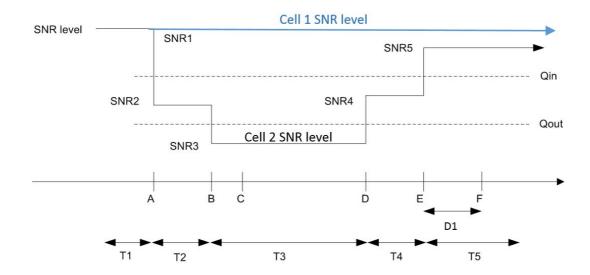


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

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

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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, and A.5.5.1.5.1-3 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 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 of [5] or [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test2.

Table A.5.5.1.5.1-1: 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 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is only r	equired 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	Test 2		
Active E-UTF	RA PCell		Cell 1	Cell 1		
E-UTRA RF	Channel Number		1	1		
Active PSCe			Cell 2	Cell 2		
	RF Channel Number		2	2		
Duplex Mode			TDD	TDD		
TDD Configuration	Config 1	-	[TDDConf.3.1]	[TDDConf.3.1]		
CORESET	Config 2 Config 1		[TDDConf.3.1] [CR. 3.1 TDD]	[TDDConf.3.1] [CR. 3.1 TDD]		
Reference	Config 2	_	[CR. 3.1 TDD]	[CR. 3.1 TDD]		
Channel	Cornig 2		[CR. 3.1 1DD]	[CK. 3.1 1DD]		
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
Configuration	Config 2		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC	Config 1		TDD	TDD		
Configuration	Config 2		TDD	TDD		
PDSCH/PDC	CC Config 1		120 KHz	120 KHz		
H subcarrier spacing	Config 2		120 KHz	120 KHz		
	assigned as RLM		[0]	[0]		
OCNG paran	neters		TBD	TBD		
CP length			Normal	Normal		
	Matrix and Antenna		[2x2 Low]	[2x2 Low]		
Configuration			,	. ,		
	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	8	8		
parameters	Ratio of hypothetical	dB	4	4		
	PDCCH RE energy to average CSI-RS					
	RE energy					
	Ratio of	dB	4	4		
	hypothetical					
	PDCCH DMRS					
	energy to average					
	CSI-RS RE energy DMRS precoder		REG bundle size	REG bundle size		
	granularity		REG buildle size	REG buildle size		
	REG bundle size		6	6		
DRX			OFF	OFF		
Gap pattern			[N.A.]	*[<i>gp0</i>]		
Layer 3 filteri	ing		Enabled	Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS configuation			TBD	TBD		
CSI-IM configuration			TBD	TBD		
Periodic CSI reporting			PUCCH	PUCCH		
CSI reporting Config 1		slot	[5]	[5]		
periodicity	Config 2		[10]	[10]		
T1		S	1	1		
T2		S	0.4	0.4		
T3		S	[0.6]	[0.6]		
D1	E apocifio DDCCH is no	S	[0.24]	[0.44]		

UE-specific PDCCH is not transmitted after T1 starts. E-UTRAN is in non-DRX mode under test. Note 1:

Note 2:

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			Test 2		
			T1	T2	T3	T1	T2	Т3
PDCCH_beta		dB		4			4	
PDCCH_[DMRS_bet	dB		4			4	
а								
PBCH_be	ta	dB						
PSS_beta	l	dB						
SSS_beta	l	dB						
PDSCH_b	eta	dB						
OCNG_be	eta	dB		0			0	
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
SINIX	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 1	dBm/		TBD			TBD	
N _{oc} Config 2		15K	TBD			TBD		
Propagation condition		Hz	[T	DL-A 30ns 75H	łz]	[T	DL-A 30ns 75H	lz]

- 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.5.5.1.5.1-1.
- 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.5.5.1.5.1-3: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Test 2		
	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: NZP-CSI-RS resource configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1		
	Value	Value		
frequencyD omainAlloca tion ^{Note 1}	row1	row2		
startingRB	0	0		
nrofRBs	Note 2	Note 2		
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.5.5.1.5.1-1				

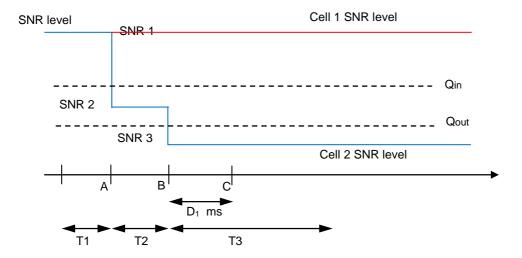


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1 (E-UTRAN PCell).

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 ($D_1 = [TBD]$ ms 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, A.5.5.1.6.1-3, A.5.5.1.6.1-4, A.5.5.1.6.1-5, and A.5.5.1.6.1-6 below. There are two cells, cell 1 which 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 of [5] or [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 4.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Configuration	figuration Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is only	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 3	Test 4	
Active E-UTRA PCell			Cell 1	Cell 1	
E-UTRA RF Channel Number			1	1	
Active PSCell			Cell 2	Cell 2	
Duplex Mode	RF Channel Number		2 TDD	2 TDD	
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configuration		1 }	[TDDConf.3.1]	[TDDConf.3.1]	
CORESET	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Reference Channel	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC	Config 1]]	TDD	TDD	
Configuration			TDD	TDD	
PDSCH/PDC H subcarrier			120 KHz	120 KHz	
spacing	Conlig 2		120 KHz	120 KHz	
RS	assigned as RLM		[0]	[0]	
OCNG parar	neters		TBD	TBD	
CP length	Matrix and Antenna		Normal	Normal	
Configuration	า		[2x2 Low]	[2x2 Low]	
	DCI format		1-0 2	1-0 2	
Out of sync	Number of Control OFDM symbols				
transmissio n	Aggregation level	CC E	8	8	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
	DCI format		1-0	1-0	
In sync	Number of Control OFDM symbols		2	2	
transmissio n	Aggregation level	CC E	4	4	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
REG bundle size			6	6	
DRX			OFF	OFF	
Gap pattern			[N.A.]	*[<i>gp0</i>]	
,	Layer 3 filtering		Enabled	Enabled	
T310 timer		ms	0	0	

T311 timer		ms	1000	1000
N310			1	1
N311			1	1
NZP CSI-RS co	onfiguration		[Resourceld 1]	[Resourceld 0]
ZP CSI-RS configuation			TBD	TBD
CSI-IM configuration			TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting	Config 1	slot	[5]	[5]
periodicity	Config 2		[10]	[10]
T1		S	1	1
T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1: UF-s	specific PDCCH i	s not transmitte	d after T1 starts	-

Note 2: E-UTRAN is in non-DRX mode under 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 3			Test 4		
		•	T1	T2	T3	T1	T2	T3
PDCCH_beta dB		dB	4			4		
PDCCH_	DMRS_bet	dB	4		4			
а								
PBCH_beta		dB						
PSS_beta	a	dB						
SSS beta		dB						
PDSCH_	beta	dB						
OCNG_beta		dB		0			0	
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
SINK	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
Config 1		dBm/	TBD			TBD		
N_{oc}	Config 2	15K		TBD	•	TBD		
	Config 2	Hz						
Propagation			[TDL-A 30ns 75Hz]			[TDL-A 30ns 75Hz]		
condition								

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.

NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time Note 3: period T1.

Note 4: 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 5:

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.

Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.6.1-1.

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.5.5.1.6.1-3: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Test 4		
	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.5.5.1.6.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1			
	Value	Value			
frequencyD omainAlloca tion ^{Note 1}	row1	row2			
startingRB	0	0			
nrofRBs	Note 2	Note 2			
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table					

A.5.5.1.6.1-1

SNR1
SNR5
Qin
SNR2
SNR3
Qout
SNR3

A
B
C
D
E
F
T6
T6

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 (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.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 of [5] or [10] 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 6.

Table A.5.5.1.7.1-1: 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 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
Note: The UE is only r	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	Va	lue
			Test 5	Test 6
Active E-UTRA PCell			Cell 1	Cell 1
E-UTRA RF Channel Number			1	1
	Active PSCell		Cell 2	Cell 2
RF Channel			2	2
Duplex Mode			TDD	TDD
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]
Configuration	0		[TDDConf.3.1]	[TDDConf.3.1]
CORESET Reference	Config 1	_	[CR. 3.1 TDD]	[CR. 3.1 TDD]
Channel	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1		TDD	TDD
Configuration			TDD	TDD
PDSCH/PDC	CC Config 1		120 KHz	120 KHz
H subcarrier spacing	Config 2		120 KHz	120 KHz
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG paran	neters		TBD	TBD
CP length			Normal	Normal
Correlation M Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]
gg	DCI format		1-0	1-0
Out of sync	Number of Control OFDM symbols		2	2
transmissio n	Aggregation level	CC E	8	8
parameters	Ratio of	dB	4	4
	hypothetical			
	PDCCH RE energy			
	to average CSI-RS RE energy			
	Ratio of	dB	4	4
	hypothetical			
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy DMRS precoder		REG bundle size	DEC hundle size
	granularity		REG buildle size	REG bundle size
	REG bundle size		6	6
DRX			640	640
Gap pattern			[N.A.]	*[<i>gp0</i>]
Layer 3 filteri	ing		Enabled	Enabled
T310 timer		ms	0	0
T311 timer		ms	1000	1000
N310			1	1
	N311		1	1
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]
ZP CSI-RS configuation CSI-IM configuration			TBD TBD	TBD TBD
Periodic CSI reporting CSI reporting Config 1		slot	PUCCH	PUCCH [5]
periodicity	Config 1 Config 2	3101	[5] [10]	[10]
T1	1 001mg 2	S	1	1
T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1	E angoifia DDCCH is no	S	[0.24]	[0.44]

UE-specific PDCCH is not transmitted after T1 starts. E-UTRAN is in non-DRX mode under test. Note 1:

Note 2:

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 5			Test 6			
			T1	T2	T3	T1	T2	T3	
PDCCH_beta		dB		4			4		
PDCCH_	DMRS_bet	dB	4		4				
а									
PBCH_be	eta	dB							
PSS_beta	Э	dB							
SSS_beta	Э	dB							
PDSCH_I	beta	dB							
OCNG_b	eta	dB		0			0		
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	
SINK	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	
	Config 1	dBm/		TBD		TBD			
N_{oc}	Config 2	15K		TBD			TBD		
Corning 2		Hz							
Propagation			[TDL-A 30ns 75Hz]		[TDL-A 30ns 75Hz]				
condition									

- 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.5.5.1.7.1-3: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in 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.5.5.1.7.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode

Field	Resourceld 0	Resourceld 1				
	Value	Value				
frequencyD omainAlloca tion ^{Note 1}	row1	row2				
startingRB	0	0				
nrofRBs	Note 2	Note 2				
Note 1: TS 38 211 [6] table 7 4 1 5 3-1						

Note 1: TS 38.211 [6] table 7.4.1.5.3-1
Note 2: nrofRBs is derived based on the
Configuration in Table
A.5.5.1.7.1-1

Table A.5.5.1.7.1-5: DRX-Configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX
mode.

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Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

Table A.5.5.1.7.1-6: TimeAlignmentTimer -Configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field		Test 5	Test 6
Field		Value	Value
TimeAlignmentT	imer	infinity	infinity
periodicityAndOffset in	Config 1, 2, 4, 5	[sl5]	[sl5]
SchedulingRequestResourc eConfig	Config 3, 6	[sl10]	[sl10]

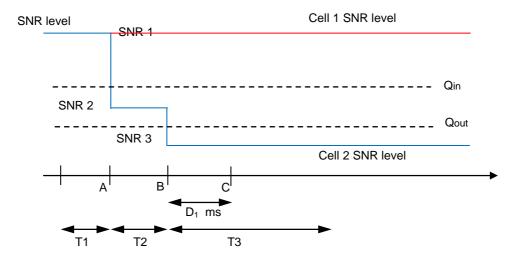


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1 (E-UTRAN PCell).

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 ($D_1 = [TBD]$ ms 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.5.5.1.8.1-4 below. There are two cells, cell 1 which 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 of [5] or [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 8.

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

Cor	nfiguration	uration Description					
	1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
2 LTE TDD, NR 240 kHz SSB SC		LTE TDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
Note:	The UE is only re	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	t Value			
					Test 7	Test 8
Active E-UTF			Cell 1	Cell 1		
	E-UTRA RF Channel Number		1	1		
Active PSCe	RF Channel Number		Cell 2	Cell 2		
Duplex Mode			2 TDD	2 TDD		
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]		
Configuration		1 }	[TDDConf.3.1]	[TDDConf.3.1]		
CORESET	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
Reference Channel	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC	Config 1]]	TDD	TDD		
Configuration			TDD	TDD		
PDSCH/PDC			120 KHz	120 KHz		
H subcarrier spacing	Conlig 2		120 KHz	120 KHz		
RS	assigned as RLM		[0]	[0]		
OCNG parar	neters		TBD	TBD		
CP length	Matrix and Antenna		Normal	Normal		
Configuration	า		[2x2 Low]	[2x2 Low]		
	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	8	8		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS	dB	4	4		
	RE energy Ratio of	dB	4	4		
	hypothetical PDCCH DMRS energy to average			·		
	CSI-RS RE energy					
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
	DCI format		1-0	1-0		
In sync	Number of Control OFDM symbols		2	2		
transmissio	Aggregation level	CC E	4	4		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			640	640		
Gap pattern			[N.A.]	*[<i>gp0</i>]		
Layer 3 filter	ing		Enabled	Enabled		
T310 timer	T310 timer		0	0		

T311 timer		ms	1000	1000
N310	N310		1	1
N311			1	1
NZP CSI-RS co	onfiguration		[Resourceld 1]	[Resourceld 0]
ZP CSI-RS cor	nfiguation		TBD	TBD
CSI-IM configuration			TBD	TBD
Periodic CSI re	Periodic CSI reporting		PUCCH	PUCCH
CSI reporting	Config 1	slot	[5]	[5]
periodicity	Config 2		[10]	[10]
T1		S	1	1
T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1: LIF-9	specific PDCCH i	s not transmitte	d after T1 starts	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit		Test 7			Test 8	
			T1	T2	T3	T1	T2	Т3
PDCCH_beta		dB		4			4	
PDCCH_DMRS_bet		dB		4			4	
а								
PBCH_be	ta	dB						
PSS_beta	l	dB						
SSS_beta		dB						
PDSCH_b	eta	dB						
OCNG_beta		dB		0			0	
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
SINK	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 1	dBm/		TBD			TBD	
N_{oc}	Config 2	15K		TBD			TBD	
	Corning 2	Hz						
Propagation			[T	DL-A 30ns 75H	lz]	[Т	DL-A 30ns 75H	lz]
condition								

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.5.5.1.8.1-1.

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.5.5.1.8.1-3: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 8	
	rieid		
	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: NZP-CSI-RS resource configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1	
	Value	Value	
frequencyD omainAlloca tionNote 1	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.5.5.1.8.1-1			

Table A.5.5.1.8.1-5: DRX-Configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
rieid	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table A.5.5.1.8.1-6: TimeAlignmentTimer -Configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode.

Field		Test 5 Value	Test 6 Value
TimeAlignmentT	imer	infinity	infinity
periodicityAndOffset in	Config 1, 2, 4, 5	[sl5]	[sl5]
SchedulingRequestResourc eConfig	Config 3, 6	[sl10]	[sl10]

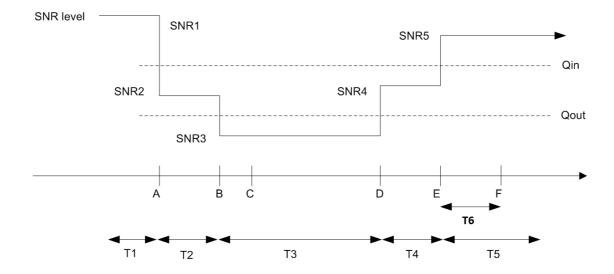


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

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 (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.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 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 ENDC specified in section 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 have 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 whole 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, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

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 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		ON	DRX related parameters are defined in Table A.5.5.2.1.1-3
Measurement gap pattern 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

Parameter		Unit	Cell 2
Connection Type			Conducted
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Initial BWP Configuration	Config 1,2		TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			
EPRE ratio of PDCCH to PI		1	0
EPRE ratio of PDSCH DMR		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)		4	
EPRE TAILO OF OCING TO OCING DIVIRS (Note 1)		٩D	TBD
Es/Noc		dB	TBD
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
Note 1: OCNG shall b	o used such that he	th calls are ful	ly allocated and a constant total transmitted newer

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

Para	ameter	Unit	Cell 2
UE orientation around TBD axis and TBD axis			TBD
Relative difference in angle of a	rrival of cell 2 relative to cell 1	degrees	TBD
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C		
TV _{oc}	NR_TDD_FR2_D	dBm/15kHz ^{Note4}	TBD
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C		
TV _{oc}	NR_TDD_FR2_D	dBm/SCSNote3	TBD
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
	NR_TDD_FR2_C		
SS-RSRP ^{Note2}	NR_TDD_FR2_D	dBm/SCS Note4	TBD
	NR_TDD_FR2_E		
	NR_TDD_FR2_F]	
	NR_TDD_FR2_G		

\hat{E}_{s}/I_{ot}		dB	TBD
Io ^{Note2}	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD
Note 1:	Interference from other cells and noise sources not spec	ified in the test is assum	ed to be constant over
	subcarriers and time and shall be modeled as AWGN of	appropriate power for Λ	I_{oc} to be fulfilled.
Note 2:	SS-RSRP and lo levels have been derived from other pa settable parameters themselves.	rameters for information	purposes. They are not
Note 3:	SS-RSRP minimum requirements are specified assuminantenna port.	g independent interferen	ce and noise at each receiver
Note 4:	Equivalent power received by an antenna with 0dBi gain	at the center of the quie	t zone
Note 5:	As observed with 0dBi gain antenna at the center of the	quiet zone	

Table A.5.5.2.1.1-5: E-UTRAN PCell DRX-Configuration for E-UTRAN TDD – NR FR2 TDD interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Field	Cell1	Comment
rieiu	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimerNote 1	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf160	
shortDRX	disable	
Note 1: UE is continuously scheduled	in NR PSCel	

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 section 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 section 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 have 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 whole 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, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

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
		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		ON	DRX related parameters are defined in
		ON	Table A.5.5.2.2.1-3
Measurement gap pattern		OFF	
ld		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
Connection Type			Conducted
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Initial BWP Configuration	Config 1,2		TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
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 PECH DMR EPRE ratio of PDCCH DMR EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PECH DMR EPRE ratio of PDSCH DMRS EPRE ratio of OCNG DMRS EPRE ratio of OCNG to OC	CH DMRS S to SSS DCCH DMRS S to SSS S to SSS DSCH S to SSS(Note 1)	dB	0
Ê _s /N _{oc}		dB	TBD
			TBD
Propagation Condition			AWGN
Time offset to cell1 Note 2		ms	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 asynchronous EN-DC

Para	ameter	Unit	Cell 2
UE orientation around TBD axis	and TBD axis		TBD
Relative difference in angle of a	rrival of cell 2 relative to cell 1	degrees	TBD
	NR_TDD_FR2_A		
	NR_TDD_FR2_B	dBm/15kHz ^{Note4}	TBD
λ/ Note1	NR_TDD_FR2_C		
TV _{oc}	NR_TDD_FR2_D		
	NR_TDD_FR2_E		
	NR_TDD_FR2_F		
	NR_TDD_FR2_G		

Io ^{Note2}	NR_TDD_FR2_A	dB dBm/95.04 MHz Note4	TBD TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	·	dP	TDD
	NR_TDD_FR2_G		
	NR_TDD_FR2_F		
	NR_TDD_FR2_E		
SS-RSRP ^{Note2}	NR_TDD_FR2_D	dBm/SCS Note4	TBD
	NR_TDD_FR2_C		
	NR_TDD_FR2_B		
	NR_TDD_FR2_A		
	NR_TDD_FR2_G		
	NR_TDD_FR2_F		
	NR_TDD_FR2_E		
$N_{oc}^{}$ Note1	NR_TDD_FR2_D	dBm/SCS ^{Note3}	TBD
Note1	NR_TDD_FR2_C		
	NR_TDD_FR2_B		
	NR_TDD_FR2_A		

- 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 modeled as AWGN of appropriate power for $N_{\rm ec}$ 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
- Note 4: Equivalent power received by an antenna with 0dBi gain at the center of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the center of the quiet zone

Table A.5.5.2.2.1-5: E-UTRAN PCell DRX-Configuration for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Field	Cell1	Comment
Field	Value	
onDurationTimer	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer ^{Note 1}	psf1	36.331
drx-RetransmissionTimer	psf1	
longDRX-CycleStartOffset	Sf320	
shortDRX	disable	
Note 1: UE is continuously schedule	II .	

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 section 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 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 NR PSCell in EN-DC specified in section 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* or *allowInterruptions* 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, 100MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	

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
		1, 2	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		OFF	
Id		OFF	
SCell measurement cycle	me	640	
(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	ter	Unit	Cell 2	Cell 3
Connection Type			Conducted	Conducted
Frequency Range			FR2	FR2
Duplex mode	Config 1		FDD	FDD
-	Config 2]	TDD	TDD
TDD configuration	Config 1		N.A	N.A
_	Config 2]	TBD	TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Initial BWP Configuration	Config 1,2		TBD	TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD	TBD
OCNG Patterns			OP.1	OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS	S to SSS			
EPRE ratio of PBCH to PB				
EPRE ratio of PDCCH DMF				
EPRE ratio of PDCCH to P		dB	0	0
EPRE ratio of PDSCH DMF				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		-		
Ê _s /N _{oc}	ino binino (note i)	dB	TBD	TBD
Propagation Condition		, , , , , , , , , , , , , , , , , , ,	AWGN	AWGN
Time offset to cell1 Note 2		us	3	3
Time offset to cell1 Note 3		μs μs	-	3
Note 1: OCNC shall be used such that bot				

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.5.5.2.3.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Р	arameter	Unit	Cell 2	Cell 3
UE orientation arou	UE orientation around TBD axis and TBD axis		TE	BD
Relative difference and cell 3 relative t	in angle of arrival of cell 2 o cell 1	degrees	TE	BD
$N_{oc}^{ m Note1}$	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_C NR_TDD_FR2_D NR_TDD_FR2_E NR_TDD_FR2_F NR_TDD_FR2_G	dBm/15kHz ^{Note4}	TBD	TBD
$N_{oc}^{}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_C NR_TDD_FR2_D NR_TDD_FR2_E NR_TDD_FR2_F NR_TDD_FR2_G	dBm/SCS ^{Note3}	TBD	TBD
SS-RSRPNote2	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_C	dBm/SCS Note4	TBD	TBD

	NR_TDD_FR2_D			
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD	TBD
Io ^{Note2}	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD	TBD
Note 1:	1: Interference from other cells and noise sources not specified in the test is assumed to be constant over			ed to be constant over
	subcarriers and time and shall be modeled 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 center of the quiet zone			
Note 5:	As observed with 0dBi gain antenna at the center of the quiet zone			

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
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
3	0.125	8 + SMTC duration

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 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 NR PSCell in EN-DC specified in section 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* or *allowInterruptions* 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, 100MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	

Table A.5.5.2.4.1-1: 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 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		OFF	
ld		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.3.1-2: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

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Parame	ter	Unit	Cell 2	Cell 3
Connection Type			Conducted	Conducted
Frequency Range			FR2	FR2
Duplex mode	Config 1		FDD	FDD
	Config 2		TDD	TDD
TDD configuration	Config 1		N.A	N.A
_	Config 2		TBD	TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Initial BWP	Config 1 2		TBD	TBD
Configuration	Config 1,2		IBD	טפו
PDSCH Reference	Config 1,2		SR.3.1 TDD	
measurement channel	Cornig 1,2		3K.3.1 TDD	-
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
parameters	Cornig 1,2		CK.3.1 TDD	CK.S.T TDD
PDCCH CORESET	Config 1,2		TBD	TBD
parameters	Cornig 1,2		100	TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMF				
EPRE ratio of PDCCH to P		dB	0	0
EPRE ratio of PDSCH DMF		-		
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)		-		
Ê _s /N _{oc}		dB	TBD	TBD
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		ms	3	3
Time offset to cell1 Note 3		นร	-	3
			, allocated and a constant to	

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

Pa	rameter	Unit	Cell 2	Cell 3
UE orientation around TBD axis and TBD			т	3D
axis				שכ
	n angle of arrival of cell 2	degrees	Т	3D
and cell 3 relative to	cell 1	ucgrees		
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C			
TV _{oc}	NR_TDD_FR2_D	dBm/15kHz ^{Note4}	TBD	TBD
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
1	NR_TDD_FR2_B		dBm/SCS ^{Note3} TBD	TBD
Ŋ Note1	NR_TDD_FR2_C			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_D	dBm/SCSNote3		
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G	1		
	NR_TDD_FR2_A			
SS-RSRPNote2	NR_TDD_FR2_B	dBm/SCS Note4	TBD	TBD
	NR_TDD_FR2_C			

	NR_TDD_FR2_D			
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD	TBD
Io ^{Note2}	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD	TBD
Note 1:	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 modeled as AWGN of appropriate power for $N_{\!oc}$ to be fulfilled.			
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:	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 center of the quiet zone			
Note 5:	As observed with 0dBi gain antenna	As observed with 0dBi gain antenna at the center 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
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
3	0.125	8 + SMTC duration

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 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 NR PSCell in EN-DC specified in section 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 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.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config	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	

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 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 SCell		Cell3	Deactivated SCell on NR RF channel 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.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell 2
Connection Type			Conducted
Frequency Range	Frequency Range		FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Initial BWP	Config 1,2		TBD
Configuration	001111g 1,2		
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET	0		OD 0.4 TDD
parameters	Config 1,2		CR.3.1 TDD
PDCCH CORESET	Confin 4.0		TDD
parameters	Config 1,2		TBD
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMF			
EPRE ratio of PDCCH to PI			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 to OCNG DMRS (Note 1)			
Ês/Noc		dB	TBD
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
NI (4 CONO I III	1 1 1 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

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

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	Parameter	Unit	Cell 2	
UE orien	tation around TBD axis and TBD axis		TBD	
Relative	difference in angle of arrival of cell 2 relative to	cell 1 degrees	TBD	
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_C			
1 voc	NR_TDD_FR2_D	dBm/15kHz ^{Note4}	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
λ/ Note1	NR_TDD_FR2_C			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_D	dBm/SCS ^{Note3}	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
	NR_TDD_FR2_C			
SS-RSRI	NR_TDD_FR2_D	dBm/SCS Note4	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	
Io ^{Note2}	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD	
Note 1:	Interference from other cells and noise source	es not specified in the test is assume	ed to be constant over	
	subcarriers and time and shall be modeled as	s AWGN of appropriate power for $\it N$	$_{oc}^{\prime}$ to be fulfilled.	
Note 2:				
Note 3:	SS-RSRP minimum requirements are specific	ed assuming independent interferend	ce and noise at each receiver	
	antenna port.			
Note 4:	Equivalent power received by an antenna with 0dBi gain at the center of the quiet zone			

A.5.5.2.5.2 Test Requirements

Note 5:

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.

As observed with 0dBi gain antenna at the center of the quiet zone

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
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
3	0.125	4 + SMTC duration

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 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 NR PSCell in EN-DC specified in section 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 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.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config	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

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 the
		1, 2	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		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	070	
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

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Parame	ter	Unit	Cell 2
Connection Type			Conducted
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TBD
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Initial BWP Configuration	Config 1,2		TBD
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET parameters	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		TBD
OCNG Patterns	•		OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
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 PI EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PI EPRE ratio of PDSCH to PI EPRE ratio of OCNG DMRS EPRE ratio of OCNG to OC	CH DMRS RS to SSS DCCH DMRS RS to SSS DSCH S to SSS DSCH S to SSS(Note 1)	dB	0
Ê _s /N _{oc}	ito bilito (itolo i)	dB	TBD
Propagation Condition			AWGN
Time offset to cell1 Note 2		ms	3
N. t. d. OONO I III			

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

Para	ameter	Unit	Cell 2	
UE orientation around TBD axis and TBD axis			TBD	
Relative difference in angle of arrival of cell 2 relative to cell 1		degrees	TBD	
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{}$ Note1	NR_TDD_FR2_C			
TV _{oc}	NR_TDD_FR2_D	dBm/15kHz ^{Note4}	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
λ/ Note1	NR_TDD_FR2_C			
$N_{oc}^{}$ Note1	NR_TDD_FR2_D	dBm/SCS ^{Note3}	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
	NR_TDD_FR2_C			
SS-RSRP ^{Note2}	NR_TDD_FR2_D	dBm/SCS Note4	TBD	
	NR_TDD_FR2_E			
	NR_TDD_FR2_F			
	NR_TDD_FR2_G			

$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD		
Io ^{Note2}	NR_TDD_FR2_A	dBm/95.04 MHz Note4	TBD		
Note 1:	Interference from other cells and noise sources not spec	cified in the test is assumed to be constant over			
	subcarriers and time and shall be modeled as AWGN of	appropriate power for Λ	I_{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 center of the quie	t zone		
Note 5:	As observed with 0dBi gain antenna at the center 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
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
3	0.125	4 + SMTC duration

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 in non-DRX

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 section 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 section. 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.4.5.3.1.1-1 and A.4.5.3.1.1-2. 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

Configuration Description				
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note: The UE i	s only required to pass in one of the supported test configurations			

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in section A.3.7.2.2

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}	Unit	Tes	st 1	Test 2		Test 3	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		freq2		freq2		fre	eq2
Duplex mode		T	DD	TDD		TE	DD
TDD configuration			onf.3.1	TDDC		TDDConf.3.1	
BWchannel	MHz		RB,c = 66		RB,c = 66		RB,c = 66
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		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					
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							
\hat{E}_s/N_{oc}	dB	TBD	TBD	TBD	TBD	TBD	TBD
Propagation conditions		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.
- 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

Doror	Parameter ^{Note 6}		Test 1		Test 2		Test 3	
Faiai			Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
Angle of arrival con	figuration		According to table		According to table		According to table	
Angle of arrival con	liguration			Κ. Χ	Α.>	ζ.Χ	A.X	(.X
	NR_TDD_FR2_A		TDD		TBD		TBD	
	NR_TDD_FR2_B	dBm/15kHz ^N					TBD	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F						TBD	
	NR_TDD_FR2_G		TBD	TBD				
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y					TBD		BD.
	NR_TDD_FR2_A	NR_TDD_FR2_A dBm/SCS ^{Note}		TDD TDD		TBD		
	NR_TDD_FR2_B	3	TBD		TBD		TBD	

	NR_TDD_FR2_F						TE	3D
$N_{oc}^{ m Note1}$	NR_TDD_FR2_G NR_TDD_FR2_T			TBD				
							TE	3D
	NR_TDD_FR2_Y						TBD	
	NR_TDD_FR2_A						TBD	TBD
	NR_TDD_FR2_B						TBD	TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	TBD	TBD	TBD	TBD	TBD	TBD
33-K3KP	NR_TDD_FR2_G	Note4					TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TE	3D
	NR_TDD_FR2_B		TBD		TBD		TBD	
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04					TBD	
	NR_TDD_FR2_G	MHz Note4					TBD	
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TBD	

- 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
- 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 section A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [3ms+TBD] as defined in section 8.3.

A.5.5.4 UE UL carrier RRC reconfiguration Delay

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 q_0 configured for a serving PSCell and that the UE performs correct SSB-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 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, 100MHz bandwidth					
2	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth					
Note: The UE is only r	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		Uni	Va	Comment	
		t	Test 1	Test 2	
Active E-UTRA PCell			Cell 1	Cell 1	
E-UTRA RF Channel			1	1	
Number					
Active P			Cell 2	Cell 2	
RF Channel Number			2	2	
Duplex Config 1			TDD	TDD	
TDD	mode Config 2		TDD	TDD	
Configu	Config 1 r Config 2		[TDDConf.3.1] [TDDConf.3.1]	[TDDConf.3.1] [TDDConf.3.1]	
ation	Corning 2		[10000111.3.1]	[1000011.3.1]	
CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
ET	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Referen					
е					
Channe					
SSB	Config 1		TBD (Note:	TBD (Note:	
Configu			periodicity is 20ms)	periodicity is 20ms)	
ation	Config 2		TBD (Note:	TBD (Note:	
SMTC	Confin 1		periodicity is 20ms) TDD	periodicity is 20ms) TDD	
Configu	Config 1				
ation	r Config 2		TDD	TDD	
PDSCH	/ Config 1		120 KHz	120 KHz	
PDCCH					
subcarri	i Canno z		120 KHz	120 KHz	
r spacin					
csi-RS-Index			[0]	[0]	
	d as RLM RS				
	parameters		TBD	TBD	
	CP length		Normal	Normal	
	Correlation Matrix and		[2x2 Low]	[2x2 Low]	
Antenna Configu					
Cornigu	DCI format		1-0	1-0	
	Number of		2	2	
Beam	Control		_	_	
failure	OFDM				
detect	symbols				
ion	Aggregation	CC	8	8	
trans	level	Е			
missio	Ratio of	dB	0	0	
n	hypothetical PDCCH RE				
param eters	energy to				
0.0.0	average				
	CSI-RS RE				
	energy				
	Ratio of	dB	0	0	
	hypothetical				
	PDCCH				
	DMRS				
	energy to				
	average				
	CSI-RS RE				
	energy DMRS		REG bundle size	REG bundle size	
	precoder		VER DRUIDIG 2176	KEG Duridle Size	
	granularity				
	REG bundle		6	6	
	size		Ŭ		
DRX			OFF	OFF	
Gap pat	tern ID		[N.A.]	*[<i>gp0</i>]	

ssb-Index			2	2	Number of SSB indexes used for beam failure detection	
rlmInSyncOutOfSync Threshold			absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).	
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB	
powerCont S	rolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS	
beamFailur MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17	
Timer	beamFailureDetection Timer		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17	
	ZP CSI-RS configuation		TBD	TBD		
CSI-IM con	CSI-IM configuration		TBD	TBD		
Periodic CS	SI reporting		PUCCH	PUCCH		
CSI	Config 1	slot	[5]	[5]		
reporting periodicit y	Config 2		[10]	[10]		
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1	
T2		S	0.4	0.4		
T3		S	[0.6]	[0.6]		
D1		S	[0.24]	[0.44]		

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 and Test 2				Test 1 and Test 2					
			SSB of set q₀					SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH_beta		dB			4					4		
PDCCH	_DMRS_bet	dB			4					4		
а												
PBCH_b	eta	dB										
PSS_bet	ta	dB										
SSS_bet	SSS beta											
PDSCH_	_beta	dB										
OCNG_b	oeta	dB			0					0		
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N _{oc} Config 1		dBm/			[-98]					[-98]		
Config 2		15K	[-98]			[-98]						
	Config 3	Hz			[-98]					[-98]		
Propagation condition				[TDL-0	C 300ns 1	100Hz]			[TDL-0	C 300ns 1	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.5.5.5.1.1-1.
- 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 [A.3.6].

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 2
rieiu	Value
gapOffset	[0]

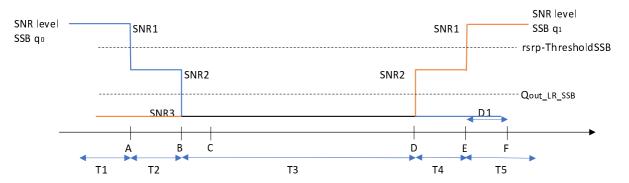


Figure A.5.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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 q_0 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 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 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. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 2.

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, 100MHz bandwidth				
2		LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth				
Note:	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

Test 1 Test 2 Cell 1 Cell 2 Cell 3 Cell 4 C	Parameter		Uni	Va	Comment	
E-UTRA RF Channel Number				Test 1	Test 2	
E-UTRA RF Channel Number	Active E	-UTRA PCell		Cell 1	Cell 1	
Active PCell Cell 2 Cell 3 Cell 4 Cell						
RF Channel Number 2						
Duplex Config 1 TDD						
Mode Config 2 TDD						
TDD						
Configuration						
According 1						
CORES Config 1 [CR. 3.1 TDD] [CR. 3.1		Comig 2		[12200111.0.1]	[12200111.0.1]	
ET Reference Channel Channel		Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Channel Channel Channel Channel Channel Channel Configur ation Config 2 TBD (Note: periodicity is 20ms) TDD (Note: periodicity is 20ms) TBD (Note: periodicity is 20ms) TDD (Note: periodicity is 20ms) TBD (Note: periodicity is 20ms) TBD (Note: periodicity is 20ms) TDD (Note: periodicity is 20ms) TDD (Note: periodicity is 20ms) TBD (Note: periodicity is 20ms) TDD (Note: periodi				[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Channel SSB Config 1 TBD (Note: periodicity is 20ms) TDD		С				
TBD (Note: periodicity is 20ms) TDD	_					
Derivation Config 2 Derivative Deriv				TDD (Note:	TPD (Note:	
Action Config 2 TBD (Note: periodicity is 20ms)						
SMTC			•			
SMTC	ation	Coming 2				
Configuration	SMTC	Config 1		<u> </u>		
PDSCH				TDD	TDD	
PDCCH subcarrie Tspacing Ts						
Subcarrie Spacing Spacin				120 KHz	120 KHz	
T spacing Csi-RS-Index Colling Csi-RS-RE Colling Csi-RS-RE Colling Csi-RS-RE Colling Csi-RS-RE Csi-RS-RE		i Conno		120 KHz	120 KHz	
csi-RS-Index assigned as RLM RS [0] [0] OCNG parameters TBD TBD CP length Normal Normal Correlation Matrix and Antenna [2x2 Low] [2x2 Low] Configuration DCI format 1-0 1-0 Number of Control OFDM Symbols 2 2 2 Ion Level Symbols E 8 8 Ion Aggregation Level Eenergy E 8 8 PDCCH RE energy to average CSI-RS RE energy CSI-RS RE energy to average CSI-RS RE energy ABB O O O O O O O O O O O O O O O O O O						
Assigned as RLM RS				[O]	[0]	
OCNG parameters TBD TBD CP length Normal Normal Correlation Matrix and Antenna Configuration [2x2 Low] Beam failure detect since trans mission n parameters DCI format DCI format Number of Control OFDM Symbols Since trans of PDCCH RE energy to average CSI-RS RE energy to a				[O]	[O]	
Normal Normal Correlation Matrix and Antenna Configuration				TBD	TBD	
Antenna						
DCI format	Correlat	Correlation Matrix and		[2x2 Low]	[2x2 Low]	
DCI format						
Number of Control Cont	Configu					
Beam failure detect detect detect symbols Symbols	-					
failure detect ion trans OFDM symbols Aggregation level CC E 8 9	Room			2	2	
Symbols Aggregation Itans Itan						
Aggregation Intrans						
E	l		CC	8	8	
n 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 DRX hypothetical PDCCH RE energy to average CSI-RS RE energy REG bundle size REG bundle size REG bundle size REG bundle size	trans					
param eters PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy 0 DMRS energy to average CSI-RS RE energy REG bundle size DMRS precoder granularity REG bundle size REG bundle size 6 DRX 640	missio		dB	0	0	
eters energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy REG bundle size DMRS precoder granularity REG bundle size REG bundle size REG bundle size		hypothetical				
average CSI-RS RE energy Ratio of dB 0 0 hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS RE energy DMRS REG bundle size REG bundle size precoder granularity REG bundle size DRX 640 640	•					
CSI-RS RE energy Ratio of dB 0 0 hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS REG bundle size Precoder granularity REG bundle size 6 6 6 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	eters					
energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX 640 0 0 0 REG bundle size REG bundle size REG bundle size						
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS REG bundle size precoder granularity REG bundle size size DRX 640 640						
hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size size DRX 640 640	-		dB	0	0	
PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Size DRX 640 640			u.D	· ·		
energy to average CSI-RS RE energy DMRS REG bundle size REG bundle size precoder granularity REG bundle size 6 6 size 640 640						
average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX 640 REG bundle size		DMRS				
CSI-RS RE energy						
energy DMRS precoder granularity REG bundle size DRX REG bundle size REG bundle size REG bundle size REG bundle size REG bundle size REG bundle size REG bundle size REG bundle size						
DMRS precoder granularity REG bundle size 6 6 6 DRX 640 640						
precoder granularity REG bundle size DRX 640 640				DEC hundle size	DEC hundle size	
granularity				NEG DUITUIE SIZE	VEQ pariale 2176	
REG bundle size 6 6 DRX 640 640		•				
DRX 640 640				6	6	
DRX 640 640				•		
Gap pattern ID [N.A.] *[gp0]	DRX			640	640	
	Gap pat	tern ID		[N.A.]	*[<i>gp0</i>]	

ssb-Index			2	2	Number of SSB
SSD-Index			2	2	indexes used for
					beam failure
					detection
rlmInSyncC	OutOfSync		absent	absent	When the field is
Threshold					absent, the UE
					applies the value
					0. (Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used
					for Q _{out_LR_SSB}
powerCont	rolOffsetS		NA	NA	Used for deriving
S					rsrp-
					ThresholdCSI-RS
beamFailur	elnstance		[n2]	[n2]	see TS 38.321 [7],
MaxCount					section 5.17
beamFailur	eDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7],
Timer					section 5.17
ZP CSI-RS	ZP CSI-RS		TBD	TBD	
configuatio	configuation				
CSI-IM con	figuration		TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI	Config 1,	slot	[5]	[5]	
reporting	2		. ,		
periodicit	Config 3		[10]	[10]	
y			. ,		
T1		S	1	1	During this time
					the the UE shall
					be fully
					synchronized to
					cell 1
T2		s	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	
	JE-specific F	DCCH	is not transmitted after 1	<u> </u>	<u>l</u>
			and and and		

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

Pa	rameter	Unit		Test	1 and To	est 2		Test 1 and Test 2				
			SSB of set q₀					SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH	_beta	dB			4					4		
PDCCH	_DMRS_bet	dB			4					4		
а												
PBCH_b	oeta	dB										
PSS_be	ta	dB										
SSS_be	ta	dB										
PDSCH_beta		dB										
OCNG_	beta	dB	0					0				
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/		•	[-98]	•		[-98]				•
Config 2 15K		15K	[-98]				[-98]					
	Config 3	Hz			[-98]					[-98]		
Propagation condition				[TDL-0	C 300ns 1	100Hz]		[TDL-C 300ns 100Hz]				
Note 1:	OCNG shal	I be used	d such the	at the res	ources in	Cell 1 a	e fully all	located a	nd a cons	stant total	transmit	ted

- 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 [A.3.6].

Table A.5.5.5.2.1-4: Measurement gap configuration for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Field	Test 2
rieid	Value
gapOffset	[0]

Table A.5.5.5.2.1-5: DRX-Configuration for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

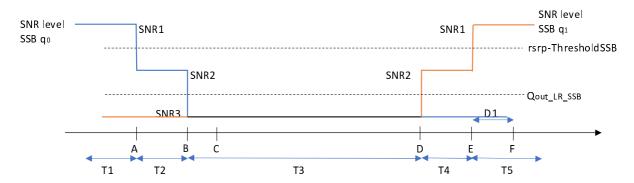


Figure A.5.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.5.5.5.3.1-3, A.5.5.5.3.1-4 and A.5.5.5.3.1-5 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.5.5.5.3.1-1 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 using GP ID #0 (40ms) in test 2.

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, 100MHz bandwidth

Table A.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

Parameter		Uni	Va	Comment	
			Test 1	Test 2	
	-UTRA PCell		Cell 1	Cell 1	
E-UTRA Number	RF Channel		1	1	
Active P			Cell 2	Cell 2	
	nnel Number		2	2	
Duplex	Config 1		TDD	TDD	
mode					
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configu ration					
CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	A.3.1.2
ET			[0	[0	
Referen					
ce					
Channe					
SSB	Config 1		SSB.1 FR2	SSB.1 FR2	A.3.10
Configu	Coming 1		JUD. I I NZ	GOD. I I NZ	A.J. 10
ration					
SMTC	Config 1		SMTC.1	SMTC.1	A.3.11
Configu					
ration	0- " 1	\vdash	400 1711	400 1/11	
PDSCH /PDCC	Config 1		120 KHz	120 KHz	
H					
subcarri					
er					
spacing					
csi-RS-Index			[0]	[0]	
	d as RLM RS	 	TDD	TDD	A 0 0 1
OCNG parameters CP length		 	TBD	TBD	A.3.2.1
	tn ion Matrix and	 	Normal [2x2 Low]	Normal [2x2 Low]	
Antenna			[حمد ٢٥٨٨]	المحدد ١٥٨٨]	
Configu	-				
	DCI format		1-0	1-0	
D -	Number of		2	2	
Beam	Control				
failure detect	OFDM symbols				
ion	Aggregation	СС	8	8	
trans	level	E			
missio	Ratio of	dB	0	0	
n	hypothetical				
param	PDCCH RE				
eters	energy to average				
	CSI-RS RE				
	energy				
-	Ratio of	dB	0	0	
	hypothetical				
	PDCCH				
	DMRS				
	energy to average				
	CSI-RS RE				
	energy				
•	DMRS		REG bundle size	REG bundle size	
	precoder				
	granularity				
	REG bundle		6	6	
DRX	size	 	OFF	OFF	
Gap pat	tern ID	+ +		*[<i>gp0</i>]	
Sup par		1	[14.7 (.)]	[360]	

csi-RS-Ind			2	2	Number of SSB indexes used for beam failure detection
rlmInSynce Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thres	holdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCon S	trolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFailu MaxCount	reInstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
Timer	beamFailureDetection Timer		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	ZP CSI-RS configuation		TBD	TBD	
CSI-IM cor	nfiguration		TBD	TBD	
Periodic C	SI reporting		PUCCH	PUCCH	
CSI	Config 1, 2	slot	[5]	[5]	
reportin g periodic ity	Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	

Note 1: UE-specific PDCCH is not transmitted after 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

Parameter Unit		Test 1 and Test 2					Test 1 and Test 2					
					-RS of se					RS of se		
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS												
	tio of PBCH	dB										
DMRS to					•					•		
	tio of PBCH	dB			0					0		
to PBCH												
EPRE ra		dB										
PDCCH	DMRS to											
SSS	t:f	4D										
EPRE ra	to PDCCH	dB										
DMRS	10 PDCCH											
EPRE ra	tio of	dB										
PDSCH		ub										
SSS	DIVINO 10											
EPRE ra	tio of	dB										
	o PDSCH	u.b										
DMRS	.0 1 20011											
	tio of OCNG	dB										
	DMRS to SSS(Note 1)											
	tio of OCNG	dB										
	DMRS (Note											
1)												
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
- · oc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS-		dBm										
RSRP ^N ote 3		/SC										
		S										
Ês/lot												
Ê _s /N _{oc}	<i>r</i> . 4.0	ID /										
lo	config 1, 2	dBm/										
		9.36 MHz										
	Config 3,	dBm/										
	Config 3,	38.1										
	"	MHz										
Propagat	ion	1911 12		г	DLA30-7	51			ГТ	DLA30-7	' 51	
condition				ι,	DL/ 100-7	~1			ι'	<i>⊃</i>	~1	
Note 1:	OCNG shall	l ho uco	d cuch th	at the rec	ources in	Coll 1 a	ro fully all	located a	nd a conc	tant total	tranemit	tod

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.5.5.5.3.1-4: Measurement gap configuration for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 2
Field	Value
gapOffset	[0]

Table A.5.5.5.3.1-5: NZP-CSI-RS resource configuration for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field		Resourceld 0	Resourceld 1		
		Value	Value		
frequency omainAllo tion ^{Note}	ca	row1	row2		
startingF	RB	0	0		
nrofRB	S	Note 2	Note 2		
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.5.1.7.1-1					

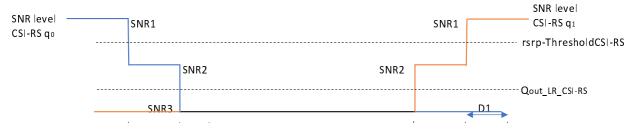


Figure A.5.5.3.1-1: SNR variation SSB for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.5.5.5.4.1-4, A.5.5.5.4.1-5 and A.5.5.5.4.1-6 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

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, 100MHz 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

Parameter		Uni	Va	lue	Comment
		t	Test 1	Test 2	
	-UTRA PCell		Cell 1	Cell 1	
E-UTRA Number	RF Channel		1	1	
Active P			Cell 2	Cell 2	
	nnel Number		2	2	
Duplex			TDD	TDD	
mode					
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configu					
ration CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	A.3.1.2
ET	Coming		[CR. 3.1 1DD]	[CK. 3.1 100]	A.S.1.2
Referen					
ce					
Channe					
000	0 " 1		000 4 500	000 4 500	A O 40
SSB Configu	Config 1		SSB.1 FR2	SSB.1 FR2	A.3.10
ration					
SMTC	Config 1		SMTC.1	SMTC.1	A.3.11
Configu			-		•
ration					
PDSCH	Config 1		120 KHz	120 KHz	
/PDCC H					
n subcarri					
er					
spacing					
csi-RS-I			[0]	[0]	
	d as RLM RS				
	parameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	
Antenna	ion Matrix and		[2x2 Low]	[2x2 Low]	
Configu	-				
	DCI format		1-0	1-0	
	Number of		2	2	
Beam	Control				
failure detect	OFDM				
ion	symbols Aggregation	CC	8	8	
trans	level	E	O		
missio	Ratio of	dB	0	0	
n	hypothetical				
param	PDCCH RE				
eters	energy to				
	average CSI-RS RE				
	energy				
ŀ	Ratio of	dB	0	0	
	hypothetical				
	PDCCH				
	DMRS				
	energy to				
	average CSI-RS RE				
	energy				
ŀ	DMRS		REG bundle size	REG bundle size	
	precoder				
	granularity				
	REG bundle		6	6	
DDV	size		640	640	
DRX Gap pat	tern ID	+ +	640 [N.A.]	640 *[<i>gp0</i>]	
Cap pai	עו וווט.	1	[14.7.]	[900]	

csi-RS-Index			2	2	Number of SSB indexes used for beam failure detection
	rlmInSyncOutOfSync Threshold		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thres	sholdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCor S	ntrolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFailu MaxCoun	ureInstance t		[n2]	[n2]	see TS 38.321 [7], section 5.17
Timer	ureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
ZP CSI-R	-		TBD	TBD	
CSI-IM co	nfiguration		TBD	TBD	
Periodic C	SI reporting		PUCCH	PUCCH	
CSI	Config 1, 2	slot	[5]	[5]	
reportin g periodic ity	Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

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 and Test 2				Test 1 and Test 2					
				-RS of se					RS of se			
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS												
	tio of PBCH	dB										
DMRS to		ID.			0					0		
	tio of PBCH	dB			U					U		
to PBCH		40										
EPRE ra		dB										
SSS	DIVIKS 10											
EPRE ra	tio of	dB										
	to PDCCH	ub										
DMRS	01 20011											
EPRE ra	tio of	dB										
PDSCH												
SSS												
EPRE ra	tio of	dB										
	to PDSCH											
DMRS												
	tio of OCNG	dB										
	SSS ^(Note 1)											
	tio of OCNG	dB										
to OCNG	DMRS (Note											
	Carefie 4	4D	TDD	TDD	TDD	TDD	TDD	TDD	TDD	TDD	TDD	TDD
SNR_C SI-RS	Config 1 Config 2	dB	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD	TBD TBD
SI-KS												
	Config 3	ID /	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
	Config 2	15K Hz			[-98]					[-98]		
SS-	Config 3	dBm			[-98]					[-98]		
RSRP ^N		/SC										
ote 3		S										
Ê _s /I _{ot}												
Ê _s /N _{oc}												
lo	config 1, 2	dBm/										
	, , , , , , , , , , , , , , , , , , ,	9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propagat				Τ]	DLA30-7	'5]			[T	DLA30-7	' 5]	
condition												
Note 1:	OCNG shall	I he used	d such th	at the rec	cources in	Cell 1 a	re fully all	located a	nd a cons	tant total	l tranemit	tod

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.5.5.5.4.1-4: Measurement gap configuration for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Test 2
rieid	Value
gapOffset	[0]

Table A.5.5.5.4.1-5: NZP-CSI-RS resource configuration for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field		Resourceld 0	Resourceld 1
		Value	Value
frequencyD omainAlloca tion ^{Note 1}		row1	row2
startingF	RB	0	0
nrofRB	S	Note 2	Note 2
Note 1: Note 2:	nro Coi	38.211 [6] table fRBs is derived in Table 1.5.1.7.1-1	based on the

Table A.5.5.5.4.1-6: DRX-Configuration for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable



Figure A.5.5.5.4.1-1: SNR variation SSB 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 q_1 .

No later than time point F occurring no later than D1 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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.5.5.6 Active BWP switch delay

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 section 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 section 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 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 PSCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from 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* 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 PSCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from 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, 100MHz bandwidth, TDD duplex mode		
	2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	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		1	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	uD	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uВ	0	
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 BWP Configuration		DLBWP.0.2
Active BWP-1 Configuration		DLBWP.1.1
Active BWP-2 Configuration		DLBWP.1.3
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
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 TS 38.213 [3] section 12.

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		According to section A.3.8.1		
Noc ^{Note 1}		dBm/15	TBD		
		kHz			
N _{oc} Note 1		dBm/SCS	TBD		
SS-RSRF	Note 2	dBm/120	TBD		
		kHz Note3			
Ês/Iot		dB	TBD		
Io ^{Note2}		dBm/95.04	TBD		
		MHz Note4			
Note 1:	Interference from 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 appropriate power for N				
Note 2:	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 antenr	na at the centre	e 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 a slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK for PSCell in a 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-Switching Delay [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 Section 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 a 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 section 8.6, and interruption requirements for NR victim cell defined in section 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in TS36.133 section 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 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 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 PSCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from 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 PSCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from 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, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100MHz 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		I	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	Ü	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	ub	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	DD
TDD configuration		TDDC	onf.3.1
BW _{channel}		100 MHz:	$N_{RB,c} = 66$
Active BWP ID		1, 2	0
Initial BWP Configuration		DLBWP.0.2	DLBWP.0.2
Active BWP-0 Configuration		NA	DLBWP.0.2
Active BWP-1 Configuration		DLBWP.1.3	NA
Active BWP-2 Configuration		DLBWP.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		OP.1	
SSB Configuration		SSB.1 FR2	
SMTC Configuration		SMTC.1	
TCI State		TBD	
TRS Configuration		TBD	
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 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.

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	According to section A.3.8.1				
N _{oc} Note 1		dBm/15 kHz	TBD	TBD	
SS-RSRI	D Note 2	dBm/120 kHz ^{Note3}	TBD	TBD	
Ês/lot		dB	TBD	TBD	
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	TBD	TBD	
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:					
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 a	antenna with 0	dBi gain at the centre of the quie	et zone	
Note 5:	As observed with 0dBi gain anten	na at the centr	e 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 a slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK for PSCell in a slot $(j+T_{BWPswitchDelay}+k1)$.

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 Section 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 Section 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 a 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 section 8.6. 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 bandwidth part configuration BWP-2, 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 PSCell's slot (i+X) as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at slot (i+X+kI). The UE shall be continuously scheduled on PSCell's BWP-2 starting from slot (i+X).

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the RRC Reconfiguration message including BWP switch command is received till an ACK 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, 100MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz 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		1	One E-UTRA radio channel is used for this
Number		ı	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 on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	U	
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

	Cell 2						
Frequenc	cy Range		FR2				
Duplex m	node		TDD				
TDD con	figuration		TDDConf.3.1				
BW _{channel}			100 MHz: N _{RB,c} = 66				
Active B\	WP ID		1, 2				
Initial BW	/P Configuration		DLBWP.0.2				
Active B\	WP-0 Configuration		NA				
Active B\	WP-1 Configuration		DLBWP.1.3				
Active B\	NP-2 Configuration		DLBWP.1.1				
PDSCH I	Reference measurement channel		SR.3.1 TDD				
RMSI CC	DRESET parameters		CR.3.1 TDD				
	d CORESET parameters		CCR.3.1 TDD				
OCNG P	atterns		OP.1				
SSB Cor	figuration		SSB.1 FR2				
SMTC C	onfiguration		SMTC.1				
TCI State	•		TBD				
TRS Cor	figuration		TBD				
Antenna	Configuration		1x2				
Propagat	tion Condition		AWGN				
	o of PSS to SSS	dB	0				
	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						
	o of PDSCH to PDSCH						
	o of OCNG DMRS to SSS(Note 1)						
	o of OCNG to OCNG DMRS (Note 1)						
Note 1:	OCNG shall be used such that bot						
Note 2	total transmitted power spectral de Interference from other cells and r						
Note 2:							
	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:							
NOTE 3.							
Note 4:	information purposes. They are not settable parameters themselves. 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2						
11016 4.	is linked with ULBWP.0.2; DLBWF						
	DLBWP.1.3 is linked with ULBWP.1.3 defined in TS 38.213 [3] section 12.						

A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in a slot (i+X+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%.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, if there are no uplink resources for reporting the ACK in a slot (i+X+kI), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of X, k1 for type 1 and type 2 UE.

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, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100MHz 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.
Gap type		1~4	n.a.	
Measurement gap repitition periodicity	ms	1~4	n.a.	
Measurement gap length	ms	1~4	n.a.	
Measurement gap offset	ms	1~4	n.a.	
SMTC configuration		1~4	SMTC.3 FR2	
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	Cel	Cell 2		II 3
			T1	T2	T1	T2
TDD configuration		1~4	TDDCc	onf.3.1	TDDC	onf.3.1
Intial BWP		1~4	DLBV	VP.0	DLBV	NP.0
configuration			ULBV	VP.0	ULBV	NP.0
Active DL BWP configuration		1~4	DLBV	VP.1	DLBV	WP.1
Active UL BWP configuration		1~4	ULBV	VP.1	ULBV	WP.1
RLM-RS		1~4	SS	B	SS	SB
PDSCH RMC configuration		1~4	SR.3.1	SR.3.1 TDD		/A
RMSI CORESET RMC configuration		1~4	CR.3.1	CR.3.1 TDD		1 TDD
Dedicated CORESET RMC configuration		1~4	CCR.3.1 TDD CCR.		CCR.3.	.1 TDD
OCNG Patterns		1~4	OP.1 OP.1		P.1	
SSB configuration		1, 2	SSB.1 FR2 SSB.1 FR2		1 FR2	
		3, 4	SSB.2	FR2	SSB.2	2 FR2
Propagation Condition		1~4	AWGN			

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	Cell 2		Cell 3	
			T1	T2	T1	T2	

AoA setup		1~4		Α.	3.8.x	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD	TBD	TBD	TBD
Note 2	dBm/15 KHz	1~4		Т	BD	
N_{oc} Note 2	dBm/SCS	1, 2	TBD			
1 voc		3, 4	TBD			
SS-RSRP	dBm/SCS	1, 2	TBD	TBD	TBD	TBD
		<u>3, 4</u>	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	1~4	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1~4	TE	3D	TE	3D

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.

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 or 3,
- [1.44s] for a UE supporting power class 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, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note	: The UE is only re	quired 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.

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		1~4	E-UTRA (Cell 1) PSCell (
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number		1~4	1: Cell 1 2: Cell 2 Cell 3	and	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	n.a.		
Measurement gap repitition periodicity	ms	1~4	n.a.		
Measurement gap length	ms	1~4	n.a.		
Measurement gap offset	ms	1~4	n.a.		
SMTC configuration		1~4	SMTC.3	FR2	
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	ON		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	Ce	Cell 2		II 3
			T1	T2	T1	T2
TDD configuration		1~4	TDDC	TDDConf.3.1 TDDCo		onf.3.1
Intial BWP		1~4	DLB'	WP.0	DLB\	NP.0
configuration			ULB	WP.0	ULB\	NP.0
Active DL BWP		1~4	DLB'	WP.1	DLB\	NP.1
configuration						
Active UL BWP		1~4	ULB'	WP.1	ULB\	NP.1
configuration						
RLM-RS		1~4	S	SB	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		OF	P.1
SSB configuration		1, 2	SSB.1 FR2		SSB.	1 FR2
		3, 4	SSB.2 FR2		SSB.2	2 FR2
Propagation		1~4	AWGN			
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	Config	Ce	II 2	Cell 3		
			T1	T2	T1	T2	
AoA setup		1~4		Α.:	3.8.x		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD	TBD	TBD	TBD	
Note 2	dBm/15 KHz	1~4	TBD				
Note 2	dBm/SCS	1, 2	TBD				
oc oc		3, 4		Т	BD		
SS-RSRP	dBm/SCS	1, 2	TBD	TBD	TBD	TBD	
		<u>3, 4</u>	TBD	TBD	TBD	TBD	
\hat{E}_s/N_{oc}	dB	3, 4	TBD	TBD	TBD	TBD	
Io	dBm/95.04MHz	1~4	TBD TBD			3D	

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 $N_{\rm ec}$ 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.5.6.1.2.1-5: DRX-Configuration for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Field	Value	Value	Comment
rieiu	Test1	Test2	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	sf640	
shortDRX	disable	disable	

Table A.5.6.1.2.1-6: *TimeAlignmentTimer* -Configuration for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Field	Value Value		Comment	
rieid	Test1	Test2		
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]	

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 or 3,
- [4.32s] for a UE supporting power class 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 or 3,
- [30.72s] for a UE supporting power class 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

	Configuration	Description
1		LTE FDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100MHz 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.5.6.1.3.1-2 ~ 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		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 gaps	
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.3 FR2	
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.5.6.1.3.1-3: 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	Unit Config		Cell 2		Cell 3	
			T1	T2	T1	T2	
TDD configuration		1~4	TDDC	onf.3.1	TDDC	onf.3.1	
Intial BWP		1~4	DLB	NP.0	DLB	WP.0	
configuration			ULB	WP.0	ULB	WP.0	
Active DL BWP		1~4	DLB	WP.1	DLB	WP.1	
configuration							
Active UL BWP		1~4	ULB	WP.1	ULB	WP.1	
configuration							
RLM-RS		1~4	S	SB	SSB		
PDSCH RMC		1~4	SR.3.	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	3.1 TDD	
CORESET RMC							
configuration							
OCNG Patterns		1~4	OI	P.1	0	P.1	
SSB	·	1, 2	SSB.1 FR2		SSB.	1 FR2	
		3, 4	SSB.2 FR2 SSE		SSB.	2 FR2	
Propagation		1~4	AWGN				
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	Cell 2		Cell 3	
			T1	T2	T1	T2

AoA setup		1~4	A.3.8.x				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD	TBD	TBD	TBD	
N_{oc} Note 2	dBm/15 KHz	1~4	TBD				
N_{oc} Note 2	dBm/SCS	1, 2	TBD				
1 voc		3, 4	TBD				
SS-RSRP	dBm/SCS	1, 2	TBD	TBD	TBD	TBD	
		<u>3, 4</u>	TBD	TBD	TBD	TBD	
\hat{E}_s/N_{oc}	dB	3, 4	TBD	TBD	TBD	TBD	
Io	dBm/95.04MHz	1~4	TBD TBD			3D	

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.

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 or 3,
- [1.92s] for a UE supporting power class 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, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired 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.

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
			Test 1	Test 2	
Active cell			E-UTRA	N PCell	
		1~4	(Cell 1)		
			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 repitition periodicity	ms	1~4	40		
Measurement gap	ms	1~4	6		
length		1~4			
Measurement gap	ms	1~4	39		
offset		1~4			
SMTC configuration		1~4	SMTC.3	FR2	
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	ON		DRX related parameters are defined in Table
		1~4			A.5.6.1.4.1-5
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		1~4			
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	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration	1~4	TDDConf.3.1	TDDConf.3.1	
Intial BWP	1~4	DLBWP.0	DLBWP.0	
configuration		ULBWP.0	ULBWP.0	
Active DL BWP	1~4	DLBWP.1	DLBWP.1	
configuration				
Active UL BWP	1~4	ULBWP.1	ULBWP.1	
configuration				
RLM-RS	1~4	CSI-RS	CSI-RS	
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	
SSB	 1, 2	SSB.1 FR2	SSB.1 FR2	
	3, 4	SSB.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	Cell 2		Cell 3	
			T1	T2	T1	T2
AoA setup		1~4	A.3.8.x			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD	TBD	TBD	TBD
Noc Note 2	dBm/15 KHz	1~4	TBD			
N_{oc} Note 2	dBm/SCS	1, 2	TBD			
1 voc		3, 4	TBD			
SS-RSRP	dBm/SCS	1, 2	TBD	TBD	TBD	TBD
		<u>3, 4</u>	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	3, 4	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1~4	TBD TBD			
	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.5.6.1.4.1-5: DRX-Configuration for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Field	Value	Value	Comment
rieiu	Test1	Test2	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	sf640	
shortDRX	disable	disable	

Table A.5.6.1.4.1-6: *TimeAlignmentTimer* -Configuration for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Field	Value	Value	Comment		
rieid	Test1	Test2			
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]		

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 or 3,
- [4.32s] for a UE supporting power class 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 or 3,
- [30.72s] for a UE supporting power class 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 ENDC 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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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, 100MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100MHz 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:	target NR cell has 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	Test 1	Test 2	
		on			
E-UTRA RF Channel		Config 1,2	1		One E-UTRAN TDD carrier
Number		0 " 10			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	-6		
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	TBD	TBD	

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	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2	,	1		2	
Duplex mode		Config 1,2	T[DD D		TDD	
BW _{channel}	MHz	Config 1,2		$_{RB,c} = 66$	100: N _{RB,c} = 66		
BWP BW	MHz	Config 1,2		RB,c = 66		$N_{RB,c} = 66$	
TDD configuration	141112			onf.3.1		Conf.3.1	
-		Config 1,2					
Initial DL BWP		Config 1,2	DLBV	VP.0.1		NA	
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	Ol	P.1	C)P.1	
PDSCH Reference		0		1 TDD		-	
measurement channel		Config 1,2					
CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11. 2		Config 1,2	SM	TC.1	SN	/ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1:	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		-			0		
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)							
UE orientation around TBD axis and TBD axis	degrees	Config 1,2	N	IA	TBD		
Relative difference in angle of		Config 1,2	N	IA	NA	TBD	
arrival of cell 3 relative to cell	degrees	Joining 1,2		., .	INA	100	
2	I.E				_		
$N_{oc}^{ m Note2}$	dBm/15 kHz		TE	3D	TBD		
	Note5	0 "			_		
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2	TBD		TBD		
CC DCDD Note 3	Note4	0			TOD	TDD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD	
\hat{E}_{s}/I_{ot}	dB	Config 1,2	TBD	TBD TBD		TBD	
\hat{E}_s/N_{oc}	dB	Config 1,2	TBD	TBD	TBD	TBD	
IoNote3	dBm/95 .04 MHz	Config 1,2	TBD	TBD	TBD	TBD	
	Note5]			
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.5.6.2.1.2 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 [TBD] 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 [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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, 100MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations
Note 2:	target NR cell has	s 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		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config 1,2			1		One E-UTRAN TDD carrier
Number							frequencies is used.
NR RF Channel		Config 1,2		1,	2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2			Cell) and	INR	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
_		_					number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Management		Confin 4.0	20		20		
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.1	ED2			As specified in clause A.3.10.2
Sivi10-33b parameters		Coming 1,2	336.1	ΓΝZ			As specified in clause A.S. 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	DRX	DRX	DRX	DRX is not used
			.1	.2	.1	.2	
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		TDD		
T2	S	Config 1,2	TBD	TBD	TBD	TBD	

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	Ce	II 2	Cell 3	
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1,2	,	İ		2
Duplex mode		Config 1,2	T	DD	TDD	
BW _{channel}	MHz	Config 1,2	100: N _F	RB,c = 66	100: N	$N_{RB,c} = 66$
BWP BW	MHz	Config 1,2		RB,c = 66		$N_{RB,c} = 66$
TDD configuration		Config 1,2		onf.3.1		Conf.3.1
Initial DL BWP		Config 1,2	DLBV	/P.0.1		NA
Dedicated DL BWP		Config 1,2	DLBV	/P.1.1		NA
Dedicated UL BWP		Config 1,2	ULBV	/P.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	C)P.1
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.3.11.1 and A.3.11. 2		Config 1,2	SM	ΓC.1	SN	/ITC.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	(o	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)						
UE orientation around TBD axis and TBD axis	degrees	Config 1,2		Α	TBD	
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	N	Α	NA	TBD
$N_{oc}^{ m Note2}$	dBm/15 kHz Note5		TE	BD	TBD	
$N_{oc}^{ m Note2}$	dBm/S CS Note4	Config 1,2	TBD		TBD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD
\hat{E}_{s}/I_{ot}	dB	Config 1,2	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	Config 1,2	TBD	TBD	TBD	TBD
IO ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2	TBD	TBD	TBD	TBD
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
	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

As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.2.2 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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.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 ENDC 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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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, 100MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations			
Note 2:	, ,				

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	Unit	Test	Value		Comment		
		configurati	Test 1	Test 2	1		
		on					
E-UTRA RF Channel		Config 1,2		1	One E-UTRAN TDD carrier		
Number		0 " 10	_		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		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	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	TBD	TBD			

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	Се	II 2	С	Cell 3		
		configuratio n	T1	T2	T1	T2		
NR RF Channel Number		Config 1,2	,	1		2		
Duplex mode		Config 1,2	TDD		TDD			
BW _{channel}	MHz	Config 1,2		RB,c = 66		$I_{RB,c} = 66$		
BWP BW	MHz	Config 1,2		RB,c = 66		I _{RB,c} = 66		
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD0	Conf.3.1		
Initial DL BWP		Config 1,2	DLBV	/P.0.1		NA		
Dedicated DL BWP		Config 1,2	DLBV	/P.1.1		NA		
Dedicated UL BWP		Config 1,2	ULBV	/P.1.1		NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	C	P.1		
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.3.11.1 and A.3.11. 2		Config 1,2	SM	ΓC.1	SM	ITC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1:	20	1	120		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS								
to SSS EPRE ratio of PBCH to PBCH					0			
DMRS EPRE ratio of PDCCH DMRS								
to SSS								
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	()				
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)								
UE orientation around TBD axis and TBD axis	degrees	Config 1,2		A	TBD			
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	N	Α	NA	TBD		
N_{oc}^{Note2}	dBm/15 kHz Note5		TE	BD	TBD			
$N_{oc}^{ m Note2}$	dBm/S CS Note4	Config 1,2	TE	BD	TBD			
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	Config 1,2	TBD	TBD	TBD	TBD		
\hat{E}_s/N_{oc}	dB	Config 1,2	TBD	TBD	TBD	TBD		
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2	TBD	TBD	TBD	TBD		
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
	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 guiet zone

A.5.6.2.3.2 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 [TBD] 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 [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD]. 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.

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, 100MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	quired 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.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		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	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	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	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	TBD	TBD	TBD	TBD	

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	Се	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2	,	1	2		
Duplex mode		Config 1,2	T	DD	TDD		
BW _{channel}	MHz	Config 1,2		RB,c = 66		I _{RB,c} = 66	
BWP BW	MHz	Config 1,2		RB,c = 66		I _{RB,c} = 66	
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1	
Initial DL BWP		Config 1,2	DLBV	/P.0.1		NA	
Dedicated DL BWP		Config 1,2	DLBV	/P.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBV	/P.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	C)P.1	
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.3.11.1 and A.3.11. 2		Config 1,2	SM	ΓC.1	SN	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	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					0		
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	()			
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)							
UE orientation around TBD axis and TBD axis	degrees	Config 1,2		Α		BD	
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2	N	Α	NA	TBD	
N_{oc}^{Note2}	dBm/15 kHz Note5		TE	BD	٦	BD	
$N_{oc}^{}$ Note2	dBm/S CS Note4	Config 1,2	TBD		7	BD	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2	TBD	TBD	TBD	TBD	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2	TBD TBD		TBD	TBD	
\hat{E}_s/N_{oc}	dB	Config 1,2	TBD	TBD	TBD	TBD	
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2	TBD	TBD	TBD	TBD	
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
	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

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, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.5.7 Measurement Performance requirements

A.5.7.1 SS-RSRP

A.5.7.1.1 intra-frequency case

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 Sections 10.1.2.1.1 and 10.1.2.1.1 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 section A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 the target cell.

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, 100MHz bandwidth, TDD duplex mode					
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
Note:	Note: 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

Parameter ^{Note 5}	Unit	Tes	st 1	Tes	st 2	Test 3	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		freq1		freq1		freq1	
Duplex mode		TE	DD	T	DD	T	D
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}	MHz	100: N _F	RB,c = 66	100: N _F	B,c = 66	100: N _F	$_{\rm B,c} = 66$
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Reference Channel		CCR.3. 1 TDD	-	CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
SMTC configuration		SMTC.	SMTC. 1	SMTC. 1	SMTC. 1	SMTC. 1	SMTC. 1
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	uБ				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	6	1	6	1	3	-1
Propagation conditions				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_{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.

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.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter ^{Note 6}		Parameter ^{Note 6} Unit		Test 1		Test 2		st 3																																				
		Onit	Cell 2	Cell 3	Cell 2 Cell 3		Cell 2	Cell 3																																				
Angle of arrival of	configuration		According to section A.3.8.X				•		•				•						•												•				•						Accord section	•	According to section A.3.8.X	
Note1	NR_TDD_FR2_A	dBm/15kHz ^N					TE	3D																																				
TV _{oc}	NR_TDD_FR2_B	ote4	TBD		TBD		TBD																																					
	NR TDD FR2 F						TBD																																					

	NR_TDD_FR2_G						TE	3D
	NR_TDD_FR2_T						TE	3D
	NR_TDD_FR2_Y						TE	3D
	NR_TDD_FR2_A						TBD	
	NR_TDD_FR2_B							3D
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}		3D		3D	TE	3D
oc .	NR_TDD_FR2_G	3	10	טט	10	טס	TE	3D
	NR_TDD_FR2_T]				-		3D
	NR_TDD_FR2_Y]					TBD	
	NR_TDD_FR2_A						TBD	TBD
	NR_TDD_FR2_B	dBm/SCS Note4	TBD	TBD	TBD	TBD	TBD	TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F						TBD	TBD
33-K3KP****	NR_TDD_FR2_G					עסו	TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A			•		•	TE	3D
	NR_TDD_FR2_B]					TE	3D
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04		3D		3D	TE	3D
10.10.02	NR_TDD_FR2_G	MHz Note4		טט	16	טט	TE	3D
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TBD	

- 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
- Note 6: All parameters apply for configuration 1 and 2

A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in sections 10.1.3.1.1 and relative accuracy requirements in section 10.1.3.1.2.

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 Sections 10.1.5.1.1 and 10.1.5.1.2 for intra 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, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, 240 kHz SSB SCS, 100MHz 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 intra 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. The TCI status for Cell 2 is defined in Table [TBD] and TRS configuration for Cell 2 is defined in Table [TBD].

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Donomoton	Confin	11:4:4	Test 1		Tes	Test 2 Cell 2 Cell 3		
Parameter	Config	Unit	Cell 2	Cell 2 Cell 3		Cell 3		
SSB ARFCN	1~4		freq1	freq2	freq1	freq2		
BW _{channel}	1~4			00: = 66	100: N _{RB,c} = 66			
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		SSB.2 FR2			B.2 FR2		
OCNG Patterns	1~4		OP.1		OP.1			
DL BWP	1~4		DLBW	/P.1.1	DLBWP.1.1			
UL BWP	1~4		ULBW	/P.1.1	ULBWP.1.1			
SMTC configuration	1~4		SMT	ΓC.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	1~4	dB	0	0	0	0		
EPRE ratio of PDSCH	1~4	uБ		U	0	U		
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	1~4	-	AW	'GN	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.

Table A.5.7.1.2.2-2: SS-RSRP inter-frequency OTA related test parameters

	Darameter	Confin	l lmi4	Test 1		Tes	t 2
	Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
	NR_TDD_FR2_A						TBD
	NR_TDD_FR2_B						TBD
N_{oc}	NR_TDD_FR2_F	1 1	dBm/15	TDD		TDD	TBD
	NR_TDD_FR2_G	1~4	kHz TBD TBD	TBD	עפו	TBD	
	NR_TDD_FR2_T						TBD
	NR_TDD_FR2_Y						TBD
	NR_TDD_FR2_A						TBD
	NR_TDD_FR2_B						TBD
	NR_TDD_FR2_F	1.2	dDm/CC	тс	D.	TDD	TBD
N_{oc}	NR_TDD_FR2_G	1,2	dBm/SS B SCS	16	TBD TBD		TBD
	NR_TDD_FR2_T		B 303				TBD
	NR_TDD_FR2_Y						TBD
	NR_TDD_FR2_A	3,4]	TE	3D	TBD	TBD

	NR_TDD_FR2_B						TBD
	NR_TDD_FR2_F						TBD
	NR_TDD_FR2_G						TBD
	NR_TDD_FR2_T						TBD
	NR_TDD_FR2_Y						TBD
	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~4	dB	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TBD
	NR_TDD_FR2_B						TBD
	NR_TDD_FR2_F	1,2		ТС	TDD		TBD
	NR_TDD_FR2_G	1,∠		TBD		TBD	TBD
	NR_TDD_FR2_T		dBm/SC				TBD
SS-	NR_TDD_FR2_Y						TBD
RSRP ^{Note1}	NR_TDD_FR2_A		S				TBD
	NR_TDD_FR2_B			TBD		TBD	TBD
	NR_TDD_FR2_F	3,4					TBD
	NR_TDD_FR2_G	3,4				100	TBD
	NR_TDD_FR2_T]		TBD			
	NR_TDD_FR2_Y						TBD
	NR_TDD_FR2_A					TBI	D
	NR_TDD_FR2_B		dBm/			TBI	D
Io ^{Note1}	NR_TDD_FR2_F	1~4	95.04M	TE	ND.	TBI	D
	NR_TDD_FR2_G	1	Hz	16	,,,	TBI	
	NR_TDD_FR2_T		''-			TBI	
	NR_TDD_FR2_Y				1	TBD	
\hat{E}_s/N_{oc}		1~4	dB	TBD	TBD	TBD	TBD

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.

A.5.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the requirements in sections 10.1.5.1.1 and 10.1.5.1.2.

A.5.7.2 SS-RSRQ

A.5.7.2.1 Intra-frequency case

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 section 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

Configuration Description							
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode					
Note:	Note: The UE is only required to pass in one of the supported test configurations						

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Paramotor	Unit	Test 1		Test 2		Test 3	
Parameter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN		Fre	eq2	Fre	eq2	Freq2	
Duplex mode		TE	DD	TDD		TE	D
TDD configuration		TDDC	TDDConf.3.1		TDDConf.3.1		onf.3.1
BW _{channel}	MHz	100: N	RB,C = 66	100: N _F	RB,c = 66	100: N _R	$_{B,c} = 66$
PDSCH Reference measurement channel		SR.3.1 TDD		SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated RMSI CORESET Reference Channel		CCR.3 .1 TDD	-	CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration				SM	TC.1		
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1
· ·		FR2	FR2	FR2	FR2	FR2	FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
SS-RSSI-Measurement				Not Ap	plicable		
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	uБ	U	U	U	U	U	U
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	-2.9	-2.9	-4	-4

- 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.

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

Poro	meter	Unit	Tes	st 1	Tes	st 2	Tes	st 3
Fala	meter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival config	nuration		Accord	ding to		ding to		ding to
Angle of anival coning			section	A.3.8.X	section	A.3.8.X	section	A.3.8.X
	NR_TDD_FR2_A						TE	3D
	NR_TDD_FR2_B						TE	3D
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz ^N	Т	3D	Т	3D	TE	3D
	NR_TDD_FR2_G	ote4	1.	טט	1.	טט	TE	3D
	NR_TDD_FR2_T						TE	3D
	NR_TDD_FR2_Y						TE	3D
	NR_TDD_FR2_A						TBD	
	NR_TDD_FR2_B						TE	3D
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	TE	3D	TBD		TBD	
	NR_TDD_FR2_G	3	1.	טט			TBD	
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TBD	
	NR_TDD_FR2_A						TBD	TBD
	NR_TDD_FR2_B						TBD	TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	TBD	TBD	TBD	TBD	TBD	TBD
33-K3KF*****	NR_TDD_FR2_G	Note4	טפו	טסו	עפו	טסו	TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
SS-RSRQ Note2	NR_TDD_FR2_A	dB	TRD	TRD	TBD	TBD	TBD	TBD
30-N3NQ	NR_TDD_FR2_B	uБ	TBD TBD		ושט ואטן		TBD	TBD

	NR_TDD_FR2_C						TBD	TBD
	NR_TDD_FR2_D						TBD	TBD
	NR_TDD_FR2_E						TBD	TBD
	NR_TDD_FR2_F						TBD	TBD
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TE	3D
	NR_TDD_FR2_B						TE	3D
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	TBD		TBD		TBD	
10,40,62	NR_TDD_FR2_G	MHz Note4	15	טט		טט	TE	3D
	NR_TDD_FR2_T						TE	3D
	NR TDD FR2 Y						TBD	

- 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, 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
- Note 6: NR operating band groups are as defined in Section 3.5.2.

A.5.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 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 alnd 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, 100MHz bandwidth, TDD duplex mode						
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						

Table A. 5.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Paramotor	Unit	Tes	Test 1		Test 2		Test 3	
Parameter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	

SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2
Duplex mode		T	DD	TDD		TDD	
TDD configuration		TDDC	onf.3.1	TDDConf.3.1		TDDConf.3.1	
BW _{channel}	MHz	100: N _F	RB,c = 66	100: N	RB,c = 66	100: N _F	RB,c = 66
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 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 SSS ^{Note 1}							
\hat{E}_s/N_{oc}	dB	TBD	TBD	TBD	TBD	TBD	TBD

- 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.

Table A. 5.7.2.2.3: SS-RSRQ Inter frequency OTA related test parameters

Davas		l locit	Tes	st 1	Tes	st 2	Tes	st 3
Parai	meter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
UE orientation around TBD axis and TBD axis		degrees	TBD		TE	3D	TE	BD
Relative difference in cell 2 relative to cell 1		degrees	NA	TBD	NA	0	NA	0
$N_{oc}^{}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G	dBm/15kHz ^N	TBD		TE	BD	TE TE TE	BD BD
	NR_TDD_FR2_T NR_TDD_FR2_Y						TBD TBD	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F	dBm/SCS ^{Note}			TDD		TBD TBD TBD	
	NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	3	11	BD	TBD		TBD TBD TBD	
	NR_TDD_FR2_A NR_TDD_FR2_B						TBD TBD	TBD TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T	dBm/SCS Note4	TBD TBD		TBD	TBD	TBD TBD TBD	TBD TBD TBD
	NR_TDD_FR2_Y						TBD	TBD
SS-RSRQ ^{Note2}	NR_TDD_FR2_A NR_TDD_FR2_B	dB	TBD	TBD	TBD	TBD	TBD TBD	TBD TBD
	NR_TDD_FR2_F						TBD	TBD

	NR_TDD_FR2_G						TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TE	3D
	NR_TDD_FR2_B						TE	3D
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04		3D		3D	TE	3D
10.10.02	NR_TDD_FR2_G	MHz Note4	10	טט	10	טפ	TE	3D
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y				į		TBD	

- 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 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the guiet zone
- Note 6: NR operating band groups are as defined in Section 3.5.2.

A.5.7.2.2.3 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.5.7.3 SS-SINR

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 Sections 9.5.2 and section 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 TBD.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description						
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						
3	LTE FDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						
4	LTE TDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						
Note: The UE is only r	Note: The UE is only required to be tested in one of the supported test configurations						

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. The TCI status for Cell 2 is defined in Table [TBD] and TRS configuration for Cell 2 is defined in Table [TBD].

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
BW _{channel}	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
SSP configuration	1,2		SSB.1 FR2	SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
DL BWP	1~4		DLBWP.1.1	DLBWP.1.1
UL BWP	1~4		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~4		SMTC.1	SMTC.1
Number of reported RS	1~4		2	2
L1-RSRP reporting period	1~4		TBD	TBD
Propagation condition	1~4		AWGN	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	1~4	dB	0	0
EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to 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 N_{oc} to be fulfilled.

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

	Parameter	Config	Unit	Test 1	Test 2
	NR_TDD_FR2_A				TBD
M	NR_TDD_FR2_B				TBD
N_{oc} Note1	NR_TDD_FR2_F	1~4	dBm/15kHz	TBD	TBD
	NR_TDD_FR2_G		UDIII/ IOKHZ	טסו	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B	1,2			TBD
	NR_TDD_FR2_F			TBD	TBD
	NR_TDD_FR2_G		dBm/SSB SCS	100	TBD
	NR_TDD_FR2_T				TBD
N_{oc}	NR_TDD_FR2_Y				TBD
Note1	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	3,4		TBD	TBD
	NR_TDD_FR2_G	5,4		100	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~4	dB	TBD	TBD
	NR_TDD_FR2_A	1,2	dBm/SSB	TBD	TBD
	NR_TDD_FR2_B	1,2	SCS	טטו	TBD

	NR_TDD_FR2_F				TBD		
	NR_TDD_FR2_G				TBD		
	NR_TDD_FR2_T				TBD		
SSB	NR_TDD_FR2_Y				TBD		
RSRP	NR_TDD_FR2_A				TBD		
Note1	NR_TDD_FR2_B				TBD		
	NR_TDD_FR2_F	2.4		TBD	TBD		
	NR_TDD_FR2_G	3,4		עסו	TBD		
	NR_TDD_FR2_T				TBD		
	NR_TDD_FR2_Y	NR_TDD_FR2_Y	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD		
	NR_TDD_FR2_B	1,2		TBD	TBD		
	NR_TDD_FR2_F		alDire /OF OANA		TBD		
	NR_TDD_FR2_G				TBD		
	NR_TDD_FR2_T				TBD		
lo Note1	NR_TDD_FR2_Y		dBm/95.04M Hz		TBD		
10	NR_TDD_FR2_A		112		TBD		
	NR_TDD_FR2_B				TBD		
	NR_TDD_FR2_F	3,4		TBD	TBD		
	NR_TDD_FR2_G	3,4		100	TBD		
	NR_TDD_FR2_T				TBD		
	NR_TDD_FR2_Y				TBD		
\hat{E}_s/N_{oc}	2	1~4	dB	TBD	TBD		

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.

A.5.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in sections 10.1.20.1.

Editor's Note: which reports are used to verify the accuracy is FFS

A.5.7.4.2 CSI-RS based L1-RSRP measurement

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 Sections 9.5.3 and section 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 TBD.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description					
1	LTE FDD, NR 120 kHz CSI-RS SCS, 100MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz CSI-RS SCS, 100MHz bandwidth, TDD duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations						

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 L1-RSRP measurement based on the CSI-RS resources 0 and 1. 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. Repetition is configured as TBD for the CSI-RS resource set. The TCI status for Cell 2 is defined in Table [TBD] and TRS configuration for Cell 2 is defined in Table [TBD].

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
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	1~2		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1~2		OP.1	OP.1
DL BWP	1~2		DLBWP.1.1	DLBWP.1.1
UL BWP	1~2		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~2		SMTC.1	SMTC.1
CSI-RS 0	1~2		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
CSI-RS 1	1~2		CSI-RS.3.3 TDD	CSI-RS.3.3 TDD
Number of reported RS	1~2		2	2
Propagation condition	1~2		AWGN	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 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	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.

Table A.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

	Parameter		Unit	Test 1	Test 2
	NR_TDD_FR2_A				TBD
λ7	NR_TDD_FR2_B				TBD
N_{oc}	NR_TDD_FR2_F	1~2	dBm/15kHz	TBD	TBD
Note2	NR_TDD_FR2_G	1~2	UDIII/ IOKHZ	עסו	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A		dBm/CSI-RS SCS	TBD	TBD
	NR_TDD_FR2_B	1~2			TBD
N_{oc}	NR_TDD_FR2_F				TBD
Note2	NR_TDD_FR2_G				TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~2	dB	TBD	TBD
CSI-RS	NR_TDD_FR2_A		dDm/CSLDS		TBD
RSRP	NR_TDD_FR2_B	1~2	dBm/CSI-RS SCS	TBD	TBD
Note3	NR_TDD_FR2_F		000		TBD

	NR_TDD_FR2_G				TBD
	NR_TDD_FR2_T]			TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B	1~2	dBm/95.04M Hz		TBD
lo Note3	NR_TDD_FR2_F			TBD	TBD
10	NR_TDD_FR2_G				TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
\hat{E}_s/N_{od}	;	1~2	dB	TBD	TBD

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.

A.5.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in sections 10.1.20.2.

Editor's Note: which reports are used to verify the accuracy is FFS

A.6 NR standalone tests in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 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

Con	figuration	Description				
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40MHz 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	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3 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			1, 2, 3	1	
Time offset	t 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	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
				pattern 1	
DRX cycle		S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	87	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	>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	TBD	T2 needs to be defined so that cell re- selection reaction time is taken into account.
T3		S	1, 2, 3	TBD	T3 needs to be defined so that cell re- selection 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	Т	DDConf.1.	1	TDDConf.1.1		
		3	Т	DDConf.2.	1	Т	DDConf.2.	1
PDSCH RMC		1	S	R.1.1 FDD)		N/A	
configuration		2	S	R.1.1 TDD)			
		3	S	R.2.1 TDD)			
RMSI CORESET		1		R.1.1 FDD)		R.1.1 FDI)
RMC configuration		2	C	R.1.1 TDD)	(R.1.1 TDI)
		3	C	R.2.1 TDD)		R.2.1 TDI)
Dedicated CORESET		1	C	CR.1.1 FD	D	С	CR.1.1 FD	D
RMC configuration		2	C	CR.1.1 TD	D	С	CR.1.1 TD	D
-		3	C	CR.2.1 TD	D	С	CR.2.1 TD	D
OCNG Pattern		1, 2, 3	OP.1 c	defined in A	.3.2.1	OP.1 c	defined in A	١.3.2.1
Initial DL BWP		1, 2, 3		DLBWP.0			DLBWP.0	
configuration								
Initial UL BWP		1, 2, 3		ULBWP.0			ULBWP.0	
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								
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
s / Tot		2						
		3						
$N_{oc}^{}$ Note2	dBm/SCS	1			-98	}		
1 voc		2			-98	}		
		3			-95	i		
N_{oc} Note2	dBm/15 kHz	1			-98	}		
1 voc		2						
		3						
\hat{E}_s/N_{oc}	dB	1	16	13	16	-infinity	16	13
L_s/V_{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	-infinity	-52.21	-52.21
		-53.94	-52.21	-52.21	-infinity	-52.21	-52.21	
	dBm/38.16 MHz	3	-47.85	-46.12	-46.12	-infinity	-46.12	-46.12
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3	<u> </u>	Not sent		<u> </u>	Not sent	
Propagation	<u> </u>	1, 2, 3			AWG	N		
Condition		., _, 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-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.1.3 **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 RRC CONNECTION REQUEST 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 TBD 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 RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than TBD 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 Tevaluate, NR intra

 T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; TBD is assumed in this test case.

This gives a total of TBD s, allow TBD s for the cell re-selection delay to a newly detectable cell and TBD s for the cell re-selection delay to an already detected cell in the test case, which we allow TBD 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. Furthermore, UE has not registered with network for the tracking area containing cell 2.

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, 10MHz bandwidth, FDD	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex				
	duplex mode	mode				
2 15 kHz SSB SCS, 10MHz bandwidth, TDD		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex				
	duplex mode	mode				
3	30 kHz SSB SCS, 40MHz bandwidth, TDD	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex				
	duplex mode	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
	1		configuration		
Initial condition	Active cell		1, 2, 3	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, 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	juration		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	
				pattern 1	
DRX cycle		S	1, 2, 3	1.28	The value shall be used for all cells in the test.
	nfiguration index		1, 2, 3	87	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	TBD	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	TBD	T3 needs to be defined so that cell re- selection 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	Cell 1				Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			N/A	•
		2	Т	DDConf.1.	1	T	DDConf.1.	1
		3	Т	DDConf.2.	1	TDDConf.2.1		
PDSCH RMC		1	5	R.1.1 FDD			N/A	
configuration		2		R.1.1 TDD				
· ·		3		R.2.1 TDD				
RMSI CORESET		1		R.1.1 FDD		(CR.1.1 FDI)
RMC configuration		2		R.1.1 TDD			CR.1.1 TDI	
3		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	
rane comigaration		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			DLBWP.0	1.0.2.1
configuration		1, 2, 3		DLDVVI .0			DLDVVI .0	
Initial UL BWP		1, 2, 3		ULBWP.0			ULBWP.0	
configuration		1, 2, 3		OLDVVI .0			OLDVVI .0	
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2, 3		-140			-140	
QIXIEVIIIII	ubili/303	3		-137			-137	
Doomponaction	٩D							
Pcompensation	dB	1, 2, 3		0			0	
Qhyst _s	dB	1, 2, 3		0		0		
Qoffset _{s, n}	dB	1, 2, 3		0		0		
Cell_selection_and_		1, 2, 3		CC DCDD			CC DCDD	
reselection_quality_				SS-RSRP			SS-RSRP	
measurement	4D	1	14	144	4.4	4	indinite.	10
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	14	14	14	-4	-infinity	12
		2						
	ID (0.00	3						
N_{oc} Note2	dBm/SCS	1			-98			
		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
OC		2						
		3			Ī	1		1
\hat{E}_s/N_{oc}	dB	1	14	14	14	-4	-infinity	12
\$ 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}			50 50					
TTILCOTIX, IOW	dB	1, 2, 3						
Propagation	ar ar	1, 2, 3 1, 2, 3		30	AWG	N	- 00	

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density Note 1: is achieved for all OFDM symbols.

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.6.1.1.2.3 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 RRC CONNECTION REQUEST 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 TBD 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 RRC CONNECTION REQUEST 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 TBD 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:

 $T_{higher_priority_search}$ 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; TBD ms is assumed in this test case.

This gives a total of TBD s, allow TBD s for the cell re-selection delay to a higher priority cell and TBD s for the cell

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

re-selection delay to a lower priority cell in the test case, which we allow TBD s.

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, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, TDD duplex mode						
	duplex mode							
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode						
	duplex mode							
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode						
	duplex mode							
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, FDD duplex mode						
	duplex mode							
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode						
	duplex mode							
6	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode						
	duplex mode							
Note: The L	Note: The UE is only required to be tested in one of the supported 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
Initial condition	Active cell		configuration 1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial 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	length	S	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	87	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
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		S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
Т3		S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell re- selection 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 TDDConf.1.1		
		2, 5			.1
		3, 6	TDDConf.2.1		
PDSCH parameters		1, 4	SR.1.1 FDD SR.1.1 TDD		D
		2, 5			D
		3, 6	0)	SR.2.1 TD	D
RMSI CORESET		1, 4	CR.1.1 FDD		D
parameters		2, 5	CR.1.1 TDD CR.2.1 TDD		D
		3, 6			D
Dedicated CORESET		1, 4	С	CR.1.1 FI	DD
parameters		2, 5	С	CR.1.1 TE	DD
		3, 6	CCR.2.1 TDD		DD
SSB parameters		1, 4	SSB.1 FR1		1
		2, 5	;	SSB.1 FR	1
		3, 6	SSB.2 FR1		1
NR SMTC parameters		1, 4	SMTC pattern 2 SMTC pattern 1		
<u> </u>		2, 5			
		3, 6		ITC patte	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 (defined in	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6		DLBWP.0)
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	
N_{oc}	dBm/SCS	1, 4	-98		
- · oc		2, 5		-98	
		3, 6		-95	

N_{oc}	dBm/15 kHz	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/ Tot		2, 5			
		3, 6			
\hat{E}_s/N_{oc}	dB	1, 4	14	14	14
L_s/V_{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 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.

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 Note 2:

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2			
		T1	T2	T3	

E LITEA DE OL	1	ı				
E-UTRA RF Channel		1				
number						
BW _{channel}	MHz	10				
OCNG Patterns defined in		OP.2 TDD for test				
TS 36.133 clause A.3.2		configuration 1, 2, 3;				
		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					
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	-140				
N_{oc}	dBm/15 kHz	-98				
RSRP	dBm/15 KHz	-infinity	-86	-102		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	-infinity	12	-4		
\hat{E}_s/N_{oc}	dB	-infinity	12	-4		
Treselection _{EUTRAN}	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 1: OCNG shall be used such that both cells are fully allocated						

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: This refers to the value of Threshx, 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 RRC CONNECTION REQUEST 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, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, TDD duplex mode
	duplex mode	
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	
6	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD	LTE 10MHz bandwidth, FDD duplex mode
	duplex mode	·
Note: The L	JE is only required to be tested in one of the suppo	orted test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	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 access procedure.
DRX cycle	length	S	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	87	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
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	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		
			T1	T2	
TDD configuration		1, 4	N/A		
		2, 5	TDDCo		
		3, 6	TDDCo	nf.2.1	
PDSCH RMC configuration		1, 4	SR.1.1	FDD	
		2, 5	SR.1.1	TDD	
		3, 6	SR.2.1	TDD	
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.		
SSB configuration		1, 4	SSB.1		
3		2, 5	SSB.1		
		3, 6	SSB.2		
SMTC configuration		1, 4	SMTC pa		
ega.a		2, 5	SMTC pa		
		3, 6	SMTC pa		
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBV		
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	-14		
QI XIC VIIIII	abili/000	3, 6	-13		
3.7	dBm/SCS	1, 4	-98		
N_{oc}	ubili/000	2, 5	-98		
		3, 6	-99		
3.7	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98		
N_{oc}	UDITI/ TO KITZ	1, 2, 3, 4, 3, 0	-30	5	
SS-RSRP	dBm/SCS	1, 4	-102	-86	
00-10011	ubili/oco	2, 5	-102	-86	
		3, 6	-99	-83	
☆ / *	dB	1, 4	-4	12	
\hat{E}_{s}/I_{ot}	QD	2, 5	- -	12	
		3, 6			
△ /	dB	1, 4	-4	12	
\hat{E}_s/N_{oc}	uБ	2, 5	-4	12	
lo.	dBm/0.26 MU~	3, 6	69 60	57 70	
lo	dBm/9.36 MHz	1, 4	-68.60	-57.78	
	dBm/9.36 MHz	2, 5	-68.60	-57.78	
Translaction	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	AW(

OCNG shall be used such that both cells are fully allocated and a constant total transmitted Note 1:

power spectral density is achieved for all OFDM symbols.

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 Note 2:

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		10			
OCNG Patterns defined in			D for test			
TS 36.133 clause A.3.2			tion 1, 2, 3;			
			D for test			
PBCH RA	dB	configura	tion 4, 5, 6			
PBCH_RB	dВ					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB					
PHICH_RA	dB	0				
PHICH_RB	dB		•			
PDCCH_RA	dB					
PDCCH_RB	dB					
PDSCH_RA	dB					
PDSCH_RB OCNG_RA ^{Note 1}	dB					
OCNG_RANGE 1	dB dB					
			40			
Qrxlevmin	dBm dBm/15 kHz		40 98			
N_{oc}	UDIII/15 KHZ		90			
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		14			
Thresh _{x, low} dB 50						
	Propagation Condition AWGN					
Note 1: OCNG shall be use						
and a constant total		ver spectral d	ensity is			
achieved for all OFI	DM symbols.					

achieved for all OFDM symbols.

Note 2: This refers to the value of Threshx, 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 RRC CONNECTION REQUEST 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%.

The cell re-selection delay to a lower priority cell can be expressed as: Tevaluate, E-UTRAN + TSI-E-UTRA,

Where:

See Table 4.2.2.5-1 in clause 4.2.2.5 Tevaluate, E-UTRAN

Maximum repetition period of relevant system info blocks that needs to be received by the UE to T_{SI-E-UTRA} 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 [v15.2.1].

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both timing advance adjustment delay and accuracy 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, 10MHz bandwidth, FDD duplex mode			
	Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
2	Source cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
	Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
3	Source cell: NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
	Target cell: NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

Table A.6.3.1.1.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Par	rameter	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	formation	-	Not Sent	No additional delays in random access procedure.
PRACH configura	tion index		TBD	As specified in table Table 6.3.3.2-3 in TS 38.211
Time offset between	en cells		3 μs	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

Parameter	Unit	Cell 1			Cell 2		
Parameter	Unit	T1	T2	Т3	T1	T2	Т3
NR RF Channel Number			1			1	

Dlass	-1-	Config 1				F	DD			
Duplex mo	ae	Config 2,3	1				DD			
		Config 1				Not Ap	plicable			
TDD config	guration	Config 2				TDDC	onf.1.1			
		Config 3					onf.2.1			
		Config 1				10: N _R	B,c = 52			
BW _{channel}		Config 2	MHz			10: N _R	$_{B,c} = 52$			
		Config 3				40: N _{RB}	$_{3,c} = 106$			
		Config 1				10: N _R	_{B,c} = 52			
BWP BW		Config 2	MHz				$_{\rm B,c} = 52$			
		Config 3				40: N _{RE}	$_{3,c} = 106$			
DRx Cycle	l		ms			Not Ap	plicable			
PDSCH R	oference	Config 1					1 FDD			
	ent channel	Config 2				SR.1.	1 TDD			
measurem	ent chamie	Config 3				SR2.	1 TDD			
CORESET	Reference	Config 1					1 FDD			
Channel	Reference	Config 2					1 TDD			
		Config 3					1 TDD			
OCNG Pat	terns	T =				OCNG p				
SMTC con	figuration	Config 1,2					.1 FR1			
		Config 3					.2 FR1			
PDSCH/PI		Config 1,2	kHz				kHz · · ·			
subcarrier		Config 3					kHz			
	UCCH/PUSCH Config 1,2		kHz		15 kHz					
	subcarrier spacing Config 3				30 kHz					
	PRACH configuration TRS configuration			FR1 PRACH configuration 1 TBD						
BWP confi		Initial DL BWP								
BVVP COIII	guraiion	Dedicated DL		DLBWP.0.1 DLBWP.1.1						
		BWP				DLDV	VF.I.I			
		Initial UL BWP			ULBWP.0.1					
		Dedicated UL					VP.1.1			
		BWP		5_5						
EPRE ratio	of PSS to SS	SS								
EPRE ratio	of PBCH DN	IRS to SSS								
EPRE ratio	of PBCH to F	PBCH DMRS								
EPRE ratio	of PDCCH D	MRS to SSS]							
		PDCCH DMRS	dB			(0			
	of PDSCH D		u u u			`	9			
	of PDSCH to									
		/IRS to SSS(Note 1)								
	of OCNG to	OCNG DMRS (Note								
1)										
$N_{oc}^{ m Note2}$	$N_{oc}^{}$ Note2		dBm/15kH z	-98						
N _{oc} Note2 Config 1,2 Config 3		dBm/SCS				98 95				
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		dB	8	-3.3	-3.3	-	2.36	2.36		
\hat{E}_s/N_{oc}		dB	8	8	8	Infinity - Infinity	11	11		
3. 00	Config 1,2		dBm/	-64.7	-60.87	-60.87	-64.7	-60.87	-60.87	
Io ^{Note3}	Config 3		9.36MHz dBm/	-60.55	-57.36	-57.36	-60.55	-57.36	-57.36	
Propagatio	on condition		38.16MHz -				'GN		21.00	
				·						

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.

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than [TBD] 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 = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] 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 [v15.2.1].

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both timing advance adjustment delay and accuracy 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, 10MHz bandwidth, FDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2	Source cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3	Source cell: NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
	Target cell: NR 30 kHz SSB SCS, 40MHz 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

Pa	rameter	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 In	formation	-	Not Sent	No additional delays in random
				access procedure.
PRACH configura	tion index		TBD	As specified in table Table 6.3.3.2-
				3 in TS 38.211
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
Farameter		T1	T2	T1	T2
NR RF Channel Number		,	1	,	1

Duplex mode	Config 1			F				
Duplox mode	Config 2,3			TE				
	Config 1			Not App				
TDD configuration	Config 2			TDDC				
	Config 3			TDDCc				
	Config 1		10: N _{RB,c} = 52					
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52					
	Config 3			40: N _{RB}	,c = 106			
	Config 1			10: N _{RE}	_{B,c} = 52			
BWP BW	Config 2	MHz		10: N _R	_{B,c} = 52			
	Config 3			40: N _{RB}	$_{,c} = 106$			
DRx Cycle	ms		Not App	olicable				
	Config 1			SR.1.	1 FDD			
PDSCH Reference measurement channel	Config 2			SR.1.	1 TDD			
	Config 3			SR2.1	TDD			
	Config 1			CR.1.	1 FDD			
CORESET Reference Channel	Config 2			CR.1.	1 TDD			
	Config 3			CR2.1 TDD				
OCNG Patterns				OCNG p				
SMTC configuration	Config 1,2			SMTC	.1 FR1			
Civil C cornigulation	Config 3			SMTC	.2 FR1			
PDSCH/PDCCH	Config 1,2	kHz	15 kHz					
subcarrier spacing	Config 3	KIIZ	30 kHz					
PUCCH/PUSCH	Config 1,2	kHz		15 l	kHz			
subcarrier spacing	Config 3	KI IZ	30 kHz					
PRACH configuration			FR1 PRACH configuration 1					
TRS configuration			TBD					
	Initial DL BWP			DLBW	/P.0.1			
BWP configuration	Dedicated DL BWP			DLBW				
2777 comigaration	Initial UL BWP			ULBW				
	Dedicated UL BWP			ULBW	/P.1.1			
EPRE ratio of PSS to SS								
EPRE ratio of PBCH DM	RS to SSS							
EPRE ratio of PBCH to F								
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS		dB		()			
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/15kH z	-98					
N_{oc} Note2 Config 1,2 Config 3		dBm/SCS	-98 -95					
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	8	8	-Infinity	8		

\hat{E}_s/N_{oc}		dB	8	8	-Infinity	8
IoNote3	Config 1,2	Config 1,2 dBm/ 9.36MHz -64.7		-60.87	-64.7	-60.87
Config 3		dBm/ 38.16MHz	-60.55	-57.36	-60.55	-57.36
Propagat	ion condition	tion - AWGN				
Note 1:	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.					wer spectral
Note 2:	·					tant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					led.
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 [TBD] 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 = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] 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 [TS38.133].

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both timing advance adjustment delay and accuracy 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

С	onfig	Description				
1		Source cell: NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
		Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2		Source cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
		Target cell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3		Source cell: NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
		Target cell: NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
Note:						

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 Information		-	Not Sent	No additional delays in random access procedure.
T1		S	5	
T2		S	≤5	
T3		S	1	

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	
Farameter	Onit	T1	T2	T1	T2
NR RF Channel Number		•	1	2	2

Duplex mode	Config 1			FD				
	Config 2,3		TDD Not Applicable					
	Config 1							
TDD configuration	Config 2			TDDC				
	Config 3			TDDC				
	Config 1		10: N _{RB,c} = 52					
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52					
	Config 3		40: N _{RB,c} = 106					
	Config 1			10: N _{RE}	_{B,c} = 52			
BWP BW	Config 2	MHz		10: N _{RE}	_{B,c} = 52			
	Config 3			40: N _{RB}	$_{c,c} = 106$			
DRx Cycle		ms		Not App	olicable			
	Config 1			SR.1.	1 FDD			
PDSCH Reference measurement channel	Config 2			SR.1.	1 TDD			
	Config 3			SR2.1	TDD			
	Config 1			CR.1.	1 FDD			
CORESET Reference Channel	Config 2			CR.1.	1 TDD			
	Config 3			CR2.1	TDD			
OCNG Patterns				OCNG p	attern 1			
SMTC configuration	Config 1,2			SMTC	.1 FR1			
Sivire configuration	Config 3			SMTC	.2 FR1			
PDSCH/PDCCH	Config 1,2	kHz	15 kHz					
subcarrier spacing	Config 3	KIIZ	30 kHz					
PUCCH/PUSCH	Config 1,2	1.11=	15 kHz					
subcarrier spacing	Config 3	kHz	30 kHz					
PRACH configuration			FR1 PRACH configuration 1					
TRS configuration			TBD					
	Initial DL BWP			DLBW	/P.0.1			
BWP	Dedicated DL BWP			DLBW				
DVVI	Initial UL BWP			ULBW				
	Dedicated UL BWP			ULBW	/P.1.1			
EPRE ratio of PSS to SS								
EPRE ratio of PBCH DM	RS to SSS							
EPRE ratio of PBCH to F								
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS		dB		()			
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/15kH z		-98				
N _{oc} Note2 Config 1,2 Config 3		dBm/SCS	-98 -95					
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	4	4	-Infinity	5			

\hat{E}_s/N_{oc}		dB	4	4	-Infinity	5
Io ^{Note3} Config 1,2 Config 3		dBm/ 9.36MHz -67.11		-67.11	-70.05	-66.59
		dBm/ 38.16MHz	-62.27	-62.27	-63.96	-61.92
Propagat	Propagation condition - AWGN					
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.					ower spectral
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					

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than [TBD] 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 = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] 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 section 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, 10MHz bandwidth, FDD duplex mode, LTE FDD					
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD					
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD					
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD					
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD					
6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE TDD					
Note: The UE is	lote: 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

Par	ameter	Unit	Value	Comment
NR RF Channel Number			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	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 configuration Id			0	As specified in Table 9.1.2-1
				started before T2 starts
T1		S	5	
T2		S	≤5	
T3			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		1, 4		FDD	
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
		3, 6		TDDConf.1.2	
BWchannel	MHz	1, 4	10:	$N_{RB,c} = 52 (FI)$	DD)
		2, 5	10:	$N_{RB,c} = 52 (TI)$	DD)
		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	
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-Threshold1	dBm	1, 2, 4, 5		-90	
	QDIII	3, 6		-87	
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		-98	
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-98	
Noc		3, 6		-95	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	0	0	0
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	0	0	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-98	-98	-98
		3, 6	-95	-95	-95
L_Note3	dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04	-67.04
Io ^{Note3}	dBm/38.16 MHz	3, 6	-60.94	-60.94	-60.94
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	ı
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix	d (1 d 11	, , , , , , , ,			

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: Ê_s/I_{ot}, SS-RSRP, and Io 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	ion Cell 2		
		-	T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6	<u> </u>	2	
Duplex mode		1, 2, 3		FDD	
1		4, 5, 6		TDD	
TDD special subframe		4, 5, 6		6	
configuration ^{Note1}		1, 2, 2		-	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5MHz: N _{RB,c} = 25	5
		, , , , ,		10MHz: N _{RB,c} = 5	
			2	0MHz: N _{RB,c} = 10	00
PRACH Configuration ^{Note2}		1, 2, 3		4	
•		4, 5, 6		53	
PDSCH parameters:		1, 2, 3		5MHz: R.7 FDD	
DL Reference Measurement				10MHz: R.3 FDD)
Channel ^{Note3}				20MHz: R.6 FDD)
		4, 5, 6		5MHz: R.4 TDD	
				10MHz: R.0 TDD)
				20MHz: R.3 TDD)
PCFICH/PDCCH/PHICH		1, 2, 3		5MHz: R.11 FDD)
parameters:			10MHz: R.6 FDD		
DL Reference Measurement				20MHz: R.10 FDI	
Channel ^{Note3}		4, 5, 6	5MHz: R.11 TDD		
			10MHz: R.6 TDD		
				20MHz: R.10 TDI	
OCNG Patterns ^{Note3}		1, 2, 3		MHz: OP.20 FD	
				0MHz: OP.10 FD	
				0MHz: OP.17 FD	
		4, 5, 6		5MHz: OP.9 TDE	
				0MHz: OP.1 TD 20MHz: OP.7 TD	
PBCH_RA		1, 2, 3, 4, 5, 6		.01VII 12. 01 .7 1D	
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_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	7
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	7	7
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91	-91
SCH_RPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91	-91
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and 1, 2, 3, 4, 5, 6 1x2 Low					
Correlation Matrix Note7		, , -, -, -, -			

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

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: \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 7: Propagation condition and correlation matrix are defined in section B.2 in TS 36.101 [25].

Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211.

Note 3: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 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.

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 section 6.1.2.1.

 $T_{interrupt} = 35$ ms in the test; $T_{interrupt}$ is defined in section 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 section 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, 10MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40MHz 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 No	umber		1	1 NR carrier frequency is used in
				the test
LTE RF Channel 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 of	quantity		SS-RSRP	
E-UTRAN measure	ement quantity		RSRP	
b2-Threshold1		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.6.3.1.5-3	for event B2
b2-Threshold2EUT	RAN	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 Info	ormation	-	Not sent	No additional delays in random
				access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		S	≤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		Cel	Cell 1	
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 4	FD	D	
•		2, 3, 5, 6	TDD		
TDD Configuration		2, 5	TDDCc	onf.1.1	
		3, 6	TDDCc	onf.1.2	
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		
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	
SMTC configuration		1, 2, 3, 4, 5, 6	SMT		
SSB configuration		1, 2, 4, 5	SSB.1		
		3, 6	SSB.2	P FR1	
b2-Threshold1	dBm	1, 2, 4, 5	-9		
	dbiii	3, 6	-8	7	
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	-9		
N _{oc} Note2	dBm/SCS	1, 2, 4, 5	-9		
		3, 6	-9		
Ês/Noc	dB	1, 2, 3, 4, 5, 6	0	0	
Ês/Iot ^{Note3}	dB	1, 2, 3, 4, 5, 6	0	0	
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-98	-98	
		3, 6	-95	-95	
Io ^{Note3}	dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04	
IU	dBm/38.16 MHz	3, 6	-60.94	-60.94	
Propagation condition		1, 2, 3, 4, 5, 6	AW	GN	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 l		
Correlation Matrix					
Nata 4: OONO ala all la a consal accelate	U4 I4I II			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: Ê_s/I_{ot}, SS-RSRP, and Io 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	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		4, 5, 6	6	
configuration ^{Note1}		1, 0, 0	-	
TDD uplink-downlink configuration Note1		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5MHz: N _{RB} ,	; = 25
			10MHz: N _{RB}	_c = 50
			20MHz: N _{RB,}	= 100
PRACH Configuration ^{Note2}		1, 2, 3	4	
		4, 5, 6	53	
PDSCH parameters:		1, 2, 3	5MHz: R.7	FDD
DL Reference Measurement			10MHz: R.3	FDD
Channel ^{Note3}			20MHz: R.6	FDD
		4, 5, 6	5MHz: R.4	TDD
			10MHz: R.0	TDD
			20MHz: R.3	
PCFICH/PDCCH/PHICH		1, 2, 3	5MHz: R.11	
parameters:			10MHz: R.6	
DL Reference Measurement			20MHz: R.1	
Channel ^{Note3}		4, 5, 6	5MHz: R.11	
			10MHz: R.6	
Notes			20MHz: R.1	
OCNG Patterns ^{Note3}		1, 2, 3	5MHz: OP.2	
			10MHz: OP.1	
		4.5.0	20MHz: OP.1	
		4, 5, 6	5MHz: OP.9	
			10MHz: OP. 20MHz: OP.	
PBCH_RA		1, 2, 3, 4, 5, 6	20101112. 01 .	1 100
PBCH_RB		., _, o, ., o, o		
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	-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		1, 2, 3, 4, 5, 6	1x2 Lov	
Correlation Matrix Note7				
Note 1: Special subframe and	unlink-downlink co	onfigurations are s	necified in table 4.2-1 in TS	36 211

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211.

Note 3: DL RMCs and OCNG patterns are specified in sections A 3.1 and A 3.2 of TS 36.133 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: \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 7: Propagation condition and correlation matrix are defined in section 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 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 section 6.1.2.1.

 $T_{interrupt} = 115$ ms in the test; $T_{interrupt}$ is defined in section 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.6.3.2.2 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

	Config	Description			
	1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
2 NR 30 kHz SSB SCS, 40MHz bandwidth, TDI		NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capabili					

Table A.6.3.2.2.1.1-1: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter		Unit	Test-1	Comments	
SSB Configur	SSB Configuration 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
					below
Number of SS	SBs per SS	-burst		2	Different from the
					definition in A.3.10
SS/PBCH blo	ck index			0,1	Different from the
		T			definition in A.3.10
Duplex Mode	for Cell 2	Config 1		FDD	_
		Config 2		TDD	
TDD Configui	ation	Config 2		TDDConf.1.2	
OCNG Patter		T = -		OCNG pattern 1	As defined in A.3.2.1.
PDSCH parai	neters	Config 1		SR1.1 FDD	As defined in A.3.1.1.
Note 4		Config 2		SR2.1 TDD	
NR RF Chanr	nel Number			1	
EPRE ratio of	PSS to SS	SS	dB		
EPRE ratio of	PBCH_DN	/IRS to SSS	dB		
EPRE ratio of	PBCH to F	PBCH_DMRS	dB		
EPRE ratio of	PDCCH_0	MRS to SSS	dB	0	
EPRE ratio of	PDCCH to	PDCCH_DMRS	dB		
EPRE ratio of	PDSCH [MRS to SSS	dB		
		PDSCH_DMRS	dB		
SSB with	\hat{E}_s/I_{ot}		dB	3	SSB with index 0 is signalled to be above
index 0	N_{oc}	Config 1	dBm/15kHz	-98	configured rsrp-
	1 voc	Config 2	_	-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSR	Note 3	ID / 000	0.5	
		Note 5	dBm/ SCS	-95	000 :: 1 4 :
SSB with	\hat{E}_s/I_{ot}		dB	-17	SSB with index 1 is signalled to be below
index 1	N_{oc}	Config 1	dBm/15kHz	-98	configured rsrp-
	OC.	Config 2		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	
	SS-RSR	Note 3	dBm/ SCS	-115	
		Config 1	dBm	-65.3/9.36MHz	For symbols without SSB
lo Note 2	lo Note 2			-62.2/38.16MHz	index 1
as DDCH Bla	ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause
					6.3.2 in TS 38.331 [2].
Configured U	E transmitte	ed power (dBm	23	As defined in clause
$P_{ m CMAX, \ f,c}$)				6.2.4 in TS 38.101-1.	
PRACH Conf	PRACH Configuration			FR1 PRACH configuration 1	As defined in A.3.x.
Propagation (Condition		-	AWGN	
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral					mitted power spectral

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: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.2.1.2.4 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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.4.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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 Subclause 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.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, 10MHz bandwidth, FDD duplex mode			
2 NR 30 kHz SSB SCS, 40		NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations depending on UE capa					

Table A.6.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

	Parame	ter	Unit	Test-1	Test-2	Comments
SSB Configu	SSB Configuration Config 1			SSB pattern 1 in	SSB pattern 1 in	As defined in
_				FR1	FR1	A.3.10, except for
		Config 2		SSB pattern 2 in	SSB pattern 2 in	number of SSBs per
				FR1	FR1	SS-burst and
						SS/PBCH block
		<u> </u>			_	index as below
Number of St	SBs per SS	-burst		2	2	Different from the
00/0001111				2.4	0.4	definition in A.3.10
SS/PBCH blo	ck index			0,1	0,1	Different from the definition in A.3.10
CSI-RS Conf	iguration	Config 1		N/A	CSI-RS.1.1 FDD	As defined in
CSI-KS COIII	iguration	Config 1 Config 2	-	IN/A	CSI-RS.2.1 TDD	As defined in A.3.1.4
Duplex Mode	for Call 2	Config 1		FDD	FDD	A.S.1.4
Duplex Mode	ioi Celi 2	Config 2	-	TDD	TDD	†
TDD Configu	ration	Config 2		TDDConf.1.2	TDDConf.1.2	
OCNG Patter	Note 1	Corning 2		OCNG pattern 1	OCNG pattern 1	As defined in
				•	·	A.3.2.1.
PDSCH para	meters	Config 1]	SR1.1 FDD	SR1.1 FDD	As defined in
Note 4		Config 2		SR2.1 TDD	SR2.1 TDD	A.3.1.1.
NR RF Chan				1	1	
EPRE ratio of			dB			
EPRE ratio of			dB			
		PBCH_DMRS	dB			
		DMRS to SSS	dB	0	0	
		PDCCH_DMRS	dB			
		OMRS to SSS	dB			
EPRE ratio of		PDSCH_DMRS	dB			000 111 1 01
SSB with	\hat{E}_s/I_{ot}		dB	3	3	SSB with index 0 is signalled to be
index 0	N_{oc}	Config 1	dBm/15kHz	-98	-98	above configured
	00	Config 2]	-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	-95	-
000 :4	\hat{E}_s/I_{ot}	•	dB	-17	-17	SSB with index 1 is
SSB with index 1	N_{oc}	Config 1	dBm/15kHz	-98	-98	signalled to be below configured
	1 oc	Config 2	1	-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	-17	1
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	1
		Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
lo Note 2	lo Note 2		1	-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
Config 2		dBm/ SCS	-5	-5	As defined in clause	
ss-PBCH-BlockPower		dbiii, ccc	Ü		6.3.2 in TS 38.331 [2].	
Configured UE transmitted power (dBm	23	23	As defined in clause	
$P_{ m CMAX, f,c}$)			-		6.2.4 in TS 38.101- 1.	
PRACH Configuration			FR1 PRACH	FR1 PRACH	As defined in	
			configuration 2	configuration 3	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: lo level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 3: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 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 Subclause 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 Subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 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 Subclause 7.1.2.

A.6.3.2.3 SA: RRC Connection Release with Redirection

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	LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD			
2	LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD			
3	LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD			
4	LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD			
5	LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD			
6 LTE FDD, NR SCS 30 kHz, BW 40 MHz, TD				
Note: The UE is only required to pass in one of the supported test configurations in FR1				

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
E-UTRA Channel Number		1,2,3,4,5,6	1	1
NR Channel Number		1,2,3,4,5,6	2	2
		1,4	Not Ap	plicable
TDD configuration		2,5	TDDC	onf.1.1
		3,6	TDDC	onf.1.2
		1,4	10: NRI	3,c = 52
BW _{channel}	MHz	2,5	10: N _R	B,c = 52
		3,6	40: N _{RE}	s,c = 106
BWP DL BWP		1,2,3,4,5,6		/P.1.1
UL BWP		1,2,3,4,5,6	ULBV	/P.1.1
DRx Cycle	ms	1,2,3,4,5,6	N/A	320 ^{Note5}
PDSCH Reference		1,4	SR.1.	1 FDD
measurement channel		2,5	SR.1.	1 TDD
modedicinon chambi		3,6	SR.2.	1 TDD
RMSI CORESET		1,4	CR.1.	1 FDD
Reference Channel		2,5	CR.1.	1 TDD
TOTOTOTO CHAINO		3,6		1 TDD
D. II. / 100DE0ET		1,4		.1 FDD
Dedicated CORESET Reference Channel		2,5		.1 TDD
Reference Charmer		3,6		.1 TDD
OCNG Patterns		1,2,3,4,5,6		P.1
SSB configuration		1,2,4,5		1 FR1
- COD comigaration		3,6		2 FR1
SMTC configuration		1,2,4,5		ГС.1
EPRE ratio of PSS to		3,6	SIVI	ГС.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 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	dB	1,2,3,4,5,6	0	0
OCNG DMRS (Note 1)	ID (1511)			
$N_{oc}^{ m Note2}$	dBm/15 kHz	1,2,3,4,5,6	-98	-98
$N_{oc}^{}$ Note2	dBm/SCS	1,2,4,5 3,6	-98 -95	-98 -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}		1,2,4,5	-95	-95
	dBm/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		/GN
SRS Config		1,2,3,4,5,6	Config1 ^{Note6}	Config2 ^{Note6}

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	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	sl1	sl1	
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1	sl640	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.6.4.1.1.1-4: DRX-Configuration for UL Timing Tests.

Field	Test 2
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-RetransmissionTimerDL	[sl1]
drx-RetransmissionTimerUL	[sl1]
longDRX-CycleStartOffset	[ms320]
shortDRX	disable

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.

+4*64Tc

- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ($N_{TA} + N_{TA_offset}$) \pm T_e of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600 for FR1 and 13792 for FR2
 - 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.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

 120
 +16*64Tc
 +8*64Tc

+8*64T_c

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 Section 7.1.2 Table 7.1.2-3. This will only be done for Test1.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \pm T_e$ of the first detected path of DL SSB. For Test 2 and Test 4 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

240

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 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, 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, 10MHz bandwidth, FDD duplex mode			
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: The 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	
DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.1-1
UL BWP		ULBWP.1.1	As specified in Table A.3.9.2.2-1
TRS		TBD	TBD
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_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	$N_{TA_new} = N_{TA_old} + 8192 * T_c$ (based on equation in TS 38.213 [3] section 4.2)
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	l Init	Test1		
Parameter	Unit	T1 T2	T2	

		Config 1		FDD
Duplex mo	ode	Config 2,3		TDD
		Config 1		Not Applicable
TDD configuration		Config 2		TDDConf.1.1
		Config 3		TDDConf.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
		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		g	ms	Not Applicable
Ditk Gyolo			1110	
		Config 1		SR.1.1 FDD
PDSCH Remeasurem	eference ent channel	Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
		Config 1		CR.1.1 FDD
CORESET Channel	CORESET Reference Channel	Config 2		CR.1.1 TDD
		Config 3		CR2.1 TDD
OCNG Pat	OCNG Patterns			OCNG pattern 1
01.170	Config 1,2			SMTC.1 FR1
SMTC con	tiguration	Config 3		SMTC.2 FR1
PDSCH/PI	DCCH	Config 1,2		15 kHz
subcarrier		Config 3	kHz	30 kHz
PUCCH/PI	USCH	Config 1,2		15 kHz
subcarrier		Config 3	kHz	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 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 DMRS (Note 1)		dB	0	
N_{oc} Note2		dBm/15kH z	-98	
N _{oc} Note2 Config 1,2			-98	
Comig C		dBm/SCS	-95	
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		dB	3	
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		dB	3
Io ^{Note3}	Config 1,2		dBm/ 9.36MHz	-67.57
	Config 3		dBm/ 38.16MHz	-62.58
Propagation condition		-	AWGN	

Note 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:	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.

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

Field		Value	Comment
c-SRS	Config 1,2	12	
U-SKS	Config 3	24	Fraguency hopping is disabled
b-S	RS	0	Frequency hopping is disabled
b-h	юр	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDom	nainShift	0	
groupOrSequ	enceHopping	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		nonCodebook	Non-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	er information see cla	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 slots after the reception of the timing advance command, where:

k = 4 for Config 1, 2, and

k = 7 for Config 3

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 Signaling characteristics

A.6.5.1 Radio link Monitoring

In the following section, 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 [TBD]) means uplink signal
- UE output power equal to or less than Transmit OFF power [-50] dBm (as defined in TS 38.101-1 [TBD]) 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.

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 2.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz			
2	TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz			
3	TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz			
	ote: The UE is only required to pass in one of the supported test configurations 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	Val	Value		
. dramotor		O.I.I.	Test 1	Test 2		
Active PCell			Cell 1	Cell 1		
RF Channel Nu			1	1		
Duplex mode	Config 1		FDD	FDD		
	Config 2, 3		TDD	TDD		
TDD	Config 1		Not Applicable	Not Applicable		
Configuration	Config 2		[TDDConf.1.1]	[TDDConf.1.1]		
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]		
CORESET	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]		
Reference	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]		
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]		
SSB	Config 1		Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1		
Configuration	Config 2		Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1		
	Config 3		Table A.3.2.2.1.2-1	Table A.3.2.2.1.2-1		
SMTC	Config 1, 2		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
Configuration	Config 3		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
PDSCH/PDCC	Config 1, 2		15 KHz	15 KHz		
H subcarrier spacing	Config 3		30 KHz	30 KHz		
PRACH Configuration	Config 1, 2		TBD	TBD		
Comiguration	Config 3		TBD	TBD		
SSB index assi	gned as RLM RS		[0]	[0]		
OCNG paramet			Table A.3.2.1.1-1	Table A.3.2.1.1-1		
CP length			Normal	Normal		
	rix and Antenna		[2x2 Low]	[2x2 Low]		
Cornigaration	DCI format		1-0	1-0		
	Number of		2	2		
Out of sync transmission	Control OFDM symbols		-	_		
parameters	Aggregation level	CC E	8	8		
	Ratio of hypothetical PDCCH RE energy to average SSS RE	dB	4	4		
	energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			OFF	OFF		
Gap pattern ID			[N.A.]	*[<i>gp0</i>]		
Layer 3 filtering	Layer 3 filtering		Enabled	Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
NZP CSI-RS configuration			TBD	TBD		
ZP CSI-RS configuation			TBD	TBD		
CSI-IM configu	CSI-IM configuration		TBD	TBD		
Periodic CSI reporting			PUCCH	PUCCH		
CSI reporting Config 1, 2 Periodicity Config 3		slot	[5] [10]	[5] [10]		
T1		S	1	1		

T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1: All configurations are assigned to the LIE 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	ameter	Unit	Test 1				Test 2			
			T1	T2	Т3	T1	T2	T3		
PDCCH_	_beta	dB	4			4				
PDCCH	DMRS_bet	dB		4			4			
а										
PBCH_b	eta	dB								
PSS_bet	a	dB								
SSS_bet	a	dB		0		0				
PDSCH_	_beta	dB								
OCNG_b	eta	dB								
SNR	Config 1	dB	[1]	[-7]	[-15]	[1]	[-7]	[-15]		
	Config 2		[1]TBD	[-7]	[-15]	[1]	[-7]	[-15]		
	Config 3		[1]TBD	[-7]	[-15]	[1]	[-7]	[-15]		
N_{oc}	Config 1	dBm/	[-98]			[-98]				
1 oc	Config 2	15K	[-98]			[-98]				
	Config 3	Hz	[-98]			[-98]				
Propaga condition			[TDL-C 300ns 100Hz]		[TD	L-C 300ns 100)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.

The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 2:

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.6.5.1.1.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE Note 5: 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 2		
		Value		
gapOffset		[0]		
Note:	Ens	Ensure that RLM RS is partially		
	overlapped with measurement			
	gap			

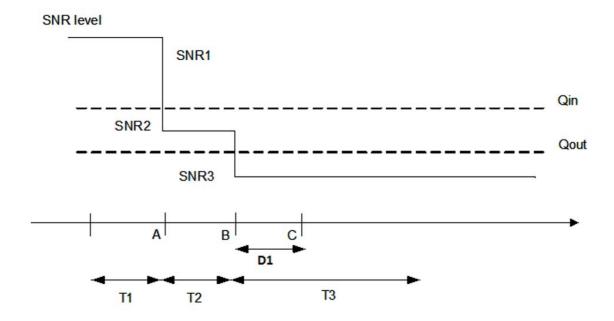


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

The UE 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.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.

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, A.6.5.1.2.1-3, and A.6.5.1.2.1-4 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.6.5.1.2.1-1 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. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configu	uration	Description		
1		FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
2		TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
3		TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz		
Note:	The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value		
			Test 1	Test 2	
Active PCell			Cell 1	Cell 1	
RF Channel Number			11	1	
Duplex mode	Config 1		FDD	FDD	
TDD 0 (1 (1	Config 2, 3		TDD	TDD	
TDD Configuration	Config 1		Not Applicable	Not Applicable	
	Config 2		[TDDConf.1.1]	[TDDConf.1.1]	
CODECET Defense	Config 3		[TDDConf.1.2]	[TDDConf.1.2]	
CORESET Referen			[CR. 1.1 FDD] [CR. 1.1 TDD]	[CR. 1.1 FDD] [CR. 1.1 TDD]	
Charmer	Config 2 Config 3	-	[CR. 1.1 TDD]	[CR. 1.1 TDD]	
SSB Configuration	Config 1		Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1	
OOD Configuration	Config 2	}	Table A.3.2.2.1.1-1	Table A.3.2.2.1.1-1	
	Config 3		Table A.3.2.2.1.2-1	Table A.3.2.2.1.2-1	
SMTC Configuration			Table A.3.2.3.1-1	Table A.3.2.3.1-1	
own o conniguration	Config 3	•	Table A.3.2.3.1-1	Table A.3.2.3.1-1	
PDSCH/PDCCH	Config 1, 2		15 KHz	15 KHz	
subcarrier spacing	•				
	Config 3 on Config 1, 2		30 KHz	30 KHz	
PRACH Configuration	J		TBD	TBD	
CCD in day a!	Config 3		TBD	TBD	
SSB index assigned OCNG parameters	as KLIVI KS		[0] Table A.3.2.1.1-1	[0] Table A.3.2.1.1-1	
CP length			Normal	Normal	
Correlation Matrix a	nd Antanna		[2x2 Low]	[2x2 Low]	
Configuration	nu Antenna		[ZAZ LOW]		
	DCI format		1-0	1-0	
In over	Number of Control		2	2	
In sync transmission	OFDM symbols	CCE	4	1	
parameters	Aggregation level Ratio of	dB	0	<u>4</u> 0	
	hypothetical PDCCH RE energy to average SSS RE energy	GD.	· ·	Ç	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0	0	
	DMRS precoder		REG bundle size	REG bundle size	
	granularity REG bundle size		6	6	
Out of sync	DCI format		1-0	1-0	
transmission parameters	Number of Control OFDM symbols		2	2	
paramotors	Aggregation level	CCE	8	8	
	Ratio of	dB	4	4	
	hypothetical PDCCH RE energy	u.D	·	·	
	to average SSS RE				
	energy Ratio of	dB	4	4	
	hypothetical PDCCH DMRS	ub	-	7	
	energy to average SSS RE energy		DE01 " :	DE01 " :	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pattern ID			[N.A.]	*[gp0]	
Layer 3 filtering			Enabled	Enabled	
T310 timer		ms	2000	2000	

T311 timer			1000	1000
N310			1	1
N311			1	1
NZP CSI-RS configuratio	n		TBD	TBD
ZP CSI-RS configuration			TBD	TBD
CSI-IM configuration			TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting	Config 1, 2	slot	[5]	[5]
periodicity	Config 3		[10]	[10]
T1		S	0.5	0.5
T2		S	0.4	0.4
T3	•	S	[1.46]	[1.36]
T4			0.4	0.4
T5		S	[1]	[1]
D1		S	[0.42]	[0.72]

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

P	Parameter	Unit	Test 1					Test 2				
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
PDCC	H_beta	dB			4					4		
PDCC	H_DMRS_beta	dB			4					4		
PBCH	_beta	dB										
PSS_b	oeta	dB										
SSS_b	oeta	dB										
PDSCI	H_beta	dB										
OCNG	_beta	dB			0					0		
SNR	Config 1	dB	[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
	Config 2		[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
	Config 3		[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
N_{oc}	Config 1	dBm/		[-98]				[-98]				
1 v oc	Config 2	15	[-98]		[-98]							
	Config 3	kHz	[-98]		[-98]							
Propag	gation condition			[TDL-0	C 300ns	100Hz]			[TDL-0	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 section [A.3.6].

Table A.6.5.1.2.1-4: Measurement gap configuration for in-sync tests in non-DRX mode

	Field	Test 2	
	rieiu	Value	
	gapOffset	[TBD]	
Note 1:	Ensure that RLM RS is partially overlapped with		
	measurement dan		

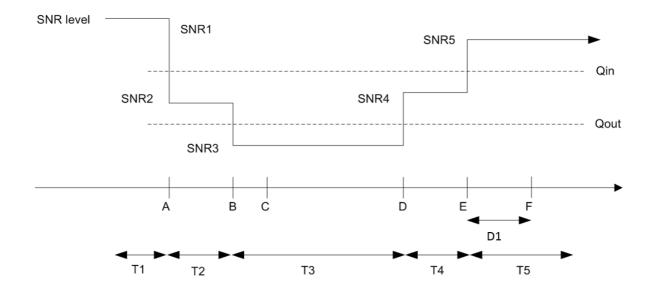


Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

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.

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, A.6.5.1.3.1-3, A.6.5.1.3.1-4, A.6.5.1.3.1-5, and A.6.5.1.3.1-6. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configura	tion	Description		
1		FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
2		TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
3		TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz		
	Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter			Value
			Test 1
Active PCell			Cell 1
RF Channel Number	r		1
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]
CORESET	Config 1		[CR. 1.1 FDD]
Reference Channel			[CR. 1.1 TDD]
	Config 3		[CR. 2.1 TDD]
SSB Configuration	Config 1		Table A.3.2.2.1.1-1
3	Config 2		Table A.3.2.2.1.1-1
	Config 3		Table A.3.2.2.1.2-1
SMTC	Config 1, 2		Table A.3.2.3.1-1
Configuration	Config 3	1	Table A.3.2.3.1-1
PDSCH/PDCCH	Config 1, 2		15 KHz
subcarrier spacing	•	4	
<u> </u>	Config 3		30 KHz
PRACH	Config 1, 2		TBD
Configuration	Config 3	 	TBD
	*	1	
SSB index assigned	l as RLM RS		[0]
OCNG parameters			Table A.3.2.1.1-1
CP length			Normal
Correlation Matrix a	nd Antenna		[2x2 Low]
Configuration			
	DCI format		1-0
	Number of Control		2
Out of sync	OFDM symbols		
transmission	Aggregation level	CCE	8
parameters	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 cycle		ms	640
Gap pattern ID			[N.A.]
Layer 3 filtering			Enabled
T310 timor		mc	0
T310 timer T311 timer		ms ms	1000
N310		ms	
			1 1
N311			•
NZP CSI-RS configuration			TBD
ZP CSI-RS configuration			TBD
CSI-IM configuration	า		TBD
Periodic CSI reporting			PUCCH
CSI reporting CSI reporting Config 1, 2		slot	[5]
periodicity	Config 1, 2	3101	[3]
portoutoity	Corning 3	-	<u> </u>
T1		S	1
T1		_	
T2		S	0.4
T2 T3		S	[7]
T2 T3 D1	urationa are accioned to	s s	

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	rameter	Unit		Test 1			
			T1	T2	T3		
PDCCH_be	ta	dB	4				
PDCCH_DN	/IRS_beta	dB		4			
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB		0			
PDSCH_bet	a	dB	1				
OCNG_beta	OCNG_beta						
SNR	Config 1	dB	[1]	[-7]	[-15]		
	Config 2		[1]	[-7]	[-15]		
	Config 3		[1]	[-7]	[-15]		
N_{oc}	Config 1	dBm/15	[-98]				
1 v oc	Config 2	KHz	[-98]				
	Config 3		[-98]				
Propagation	condition		[TDL-C 300ns 100Hz]				
Note 1: C	CNG shall be use	ed such that t	the resources in Cell	1 are fully allocated	and a constant total		
			sity is achieved for al				
Note 2: T	he signal contains	PDCCH for	UEs other than the	device under test as p	part of OCNG.		
Note 3: S	NR levels corresp	ond to the si	ignal to noise ratio ov	er the SSS REs.			

The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively Note 4: in Figure A.6.5.1.3.1-1.

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.6.5.1.3.1-5: DRX-Configuration for out-of-sync tests.

Field	Test 1		
Field	Value		
drx-onDurationTimer	[ms6]		
drx-InactivityTimer	[ms1]		
drx-RetransmissionTimerDL	[sl1]		
drx-RetransmissionTimerUL	[sl1]		
longDRX-CycleStartOffset	[ms640]		
shortDRX	disable		

Table A.6.5.1.3.1-6: DRX-Configuration for out-of-sync tests.

Field	Test 1 Value	
TimeAlignmentTimer	infinity	
periodicityAndOffset in	Config 1, 2	[sl5]
SchedulingRequestResourc eConfig	Config 3	[sl10]

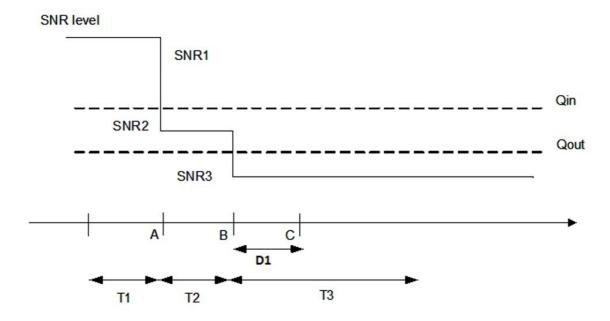


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

The UE 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.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.

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, A.6.5.1.4.1-3, A.6.5.1.4.1-4, and A.6.5.1.4.1-5. 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.

Editor note: whether to revise power level to be gradually changed

Editor note: whether to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configu	uration	Description		
1		FDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
2		TDD, SSB SCS 15 KHz, data SCS 15KHz, BW 10MHz		
3		TDD, SSB SCS 30 KHz, data SCS 30KHz, BW 40MHz		
Note:	The UE is only required to pass in one of the supported test configurations 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
A (' BO !!			0.114
Active PCell RF Channel	Number		Cell 1
Duplex mode			FDD
Варюжнюа	Config 2, 3	1	TDD
TDD	Config 1		Not Applicable
Configuration	n Config 2		[TDDConf.1.1]
	Config 3		[TDDConf.1.2]
CORESET	Config 1		[CR. 1.1 FDD]
Reference	Config 2		[CR. 1.1 TDD]
Channel	Config 3		[CR. 2.1 TDD]
SSB	Config 1	4	Table A.3.2.2.1.1-1
Configuration	Ŭ	4	Table A.3.2.2.1.1-1
SMTC	Config 3		Table A.3.2.2.1.2-1 Table A.3.2.3.1-1
Configuration	Config 1, 2 Config 3	-	Table A.3.2.3.1-1
PDSCH/PDC			15 KHz
H subcarrier	3 ,	4	
spacing	Config 3		30 KHz
PRACH	Config 1, 2		TBD
Configuration	Config 3		TBD
SSB index a	ssigned as RLM RS		[0]
OCNG parar			Table A.3.2.1.1-1
CP length			Normal
	Matrix and Antenna		[2x2 Low]
Configuration	n		
	DCI format		1.0
	Number of Control		1-0
In sync	OFDM symbols		2
transmissio	Aggregation level	CCE	4
n	Ratio of hypothetical	dB	0
parameters (Note 1)	PDCCH RE energy to		
(Note 1)	average SSS RE energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy	ub	O
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync	DCI format		1-0
transmissio	Number of Control		2
n parameters	OFDM symbols	CCE	0
(Note 1)	Aggregation level Ratio of hypothetical	CCE dB	8 4
(14010-1)	PDCCH RE energy to	ub	4
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy		
	to average SSS RE		
	energy DMRS precoder		DEC homelie
			REG bundle size
	granularity REG bundle size	+	6
DRX cycle	1	ms	40
Gap pattern	ID		[N.A.]
Layer 3 filter			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1

N311			1
NZP CSI-RS co	nfiguration		TBD
ZP CSI-RS Cor	figuration		TBD
CSI-IM configur	ation		TBD
Daniadia CCI res			DUCCU
Periodic CSI re	porting		PUCCH
CSI reporting	Config 1, 2	slot	[5]
periodicity	Config 3		[10]
T1		S	4
T2		S	1.6
T3		S	[1.36]
T4		S	0.4
T5		S	0.4
D1		S	[1]
Note 1: All co	onfigurations are assign	ed to the LI	Finger 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.

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					
		T1	T2	Т3	T4	T5	
PDCCH_beta	dB	4					
PDCCH_DMRS_bet	dB			4			
а							
PBCH_beta	dB						
PSS_beta	dB						
SSS_beta	dB						
PDSCH_beta	dB						
OCNG_beta	dB			0			
SNR Config 1, 4	dB	[1]	[-7]	[-15]	[-4.5]	[1]	
Config 2, 5		[1]	[-7]	[-15]	[-4.5]	[1]	
Config 3, 6		[1]	[-7]	[-15]	[-4.5]	[1]	
N _{oc} Config 1, 4	dBm/	[-98]					
Config 2, 5	15	[-98]					
Config 3, 6	kHz	[-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 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 section [A.3.6].

Table A.6.5.1.4.1-4: DRX-Configuration for in-sync tests

Field	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-	[sl1]
RetransmissionTimerDL	
drx-	[sl1]
RetransmissionTimerUL	
longDRX-	[ms40]
CycleStartOffset	
shortDRX	disable

Table A.6.5.1.4.1-5: TimeAlignmentTimer -Configuration for in-sync testing

Field	Test 1 Value	
TimeAlignmentTimer		infinity
periodicityAndOffset in	Config 1, 2	[sl5]
SchedulingRequestResourc eConfig	Config 3	[sl10]

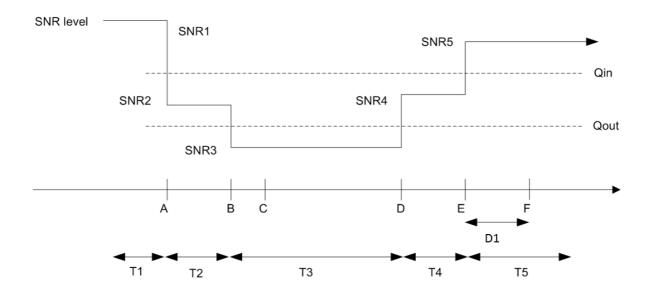


Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

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, and A.6.5.1.5.1-3 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 insync 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] or [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 test2.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

Confi	guration	Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
3		TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth				
Note:	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

Parameter		Unit	Va	Value		
		0	Test 1	Test 2		
Active PCell			Cell 1	Cell 1		
RF Channel	RF Channel Number		1	1		
Duplex mode			FDD	FDD		
	Config 2, 3		TDD	TDD		
TDD	Config 1		Not Applicable	Not Applicable		
Configuration	n Config 2		[TDDConf.1.1]	[TDDConf.1.1]		
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]		
CORESET	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]		
Reference	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]		
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]		
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
Configuration	n Config 2		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC	Config 1, 2		FR1 patterm 1	FR1 patterm 1		
Configuration			FR1 patterm 2	FR1 patterm 2		
PDSCH/PDC			15 KHz	15 KHz		
H subcarrier	<u> </u>	4				
spacing	Config 3		30 KHz	30 KHz		
csi-RS-Index RS	assigned as RLM		[0]	[0]		
OCNG parar	neters		TBD	TBD		
CP length			Normal	Normal		
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]		
Comigaration	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmissio	Aggregation level	CC	8	8		
n	5 // (E		,		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			OFF	OFF		
Gap pattern			[N.A.]	*[<i>gp0</i>]		
Layer 3 filter	ing		Enabled	Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
	NZP CSI-RS configuration		[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS o	configuation		TBD	TBD		
	CSI-IM configuration		TBD	TBD		
Periodic CSI			PUCCH	PUCCH		
CSI reporting		slot	[5]	[5]		
periodicity	Config 3		[10]	[10]		
T1		s	1	1		
T2		s	0.4	0.4		
T3		S	[0.6]	[0.6]		
D1		S	[0.24]	[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	Test 1				Test 2	
			T1	T2	T3	T1	T2	T3
PDCCH	_beta	dB		4			4	
PDCCH	_DMRS_bet	dB		4			4	
а								
PBCH_I	oeta	dB						
PSS_be	eta	dB						
SSS_be	eta	dB	0		0			
PDSCH	_beta	dB	7					
OCNG_	beta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/		[-98]		[-98]		
1 oc	Config 2	15K	[-98]		[-98]			
	Config 3	Hz	[-98]				[-98]	
Propaga conditio			[TD	L-C 300ns 100)Hz]	[TDL-C 300ns 100Hz])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 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.6.5.1.5.1-3: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 2
Field	Value
gapOffset	[0]
Note 1: E-UTRAN PCell and PSCe synchronous and frame be aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table A.6.5.1.5.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1			
	Value	Value			
frequencyD omainAlloca tion ^{Note 2}	row1	row2			
startingRB	0	0			
nrofRBs	Note 2	Note 2			
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table					

SNR 1

Qin

SNR 2

Qout

SNR 3

Cell 1 SNR level

A

B

C

D₁ ms

T3

A.6.5.1.5.1-1

Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

T2

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 ($D_1 = [TBD]$ 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, A.6.5.1.6.1-3, A.6.5.1.6.1-4, A.6.5.1.6.1-5, and A.6.5.1.6.1-6 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 of [5] or [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 4.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Config	uration	Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
3		TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth				
Note: Th	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	Va	Value		
	<u></u>		Test 3	Test 4		
Active PCell			Cell 1	Cell 1		
RF Channel	Number		1	1		
Duplex mode	Config 1		FDD	FDD		
	Config 2, 3		TDD	TDD		
TDD	Config 1		Not Applicable	Not Applicable		
Configuration	Config 2		[TDDConf.1.1]	[TDDConf.1.1]		
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]		
CORESET	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]		
Reference	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]		
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]		
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC	Config 1, 2		FR1 patterm 1	FR1 patterm 1		
Configuration			FR1 patterm 2	FR1 patterm 2		
PDSCH/PDC	CC Config 1, 2		15 KHz	15 KHz		
H subcarrier	Config 3	-	30 KHz	30 KHz		
spacing						
csi-RS-Index RS	assigned as RLM		[0]	[0]		
OCNG parar	neters		TBD	TBD		
CP length			Normal	Normal		
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]		
	DCI format		1-0	1-0		
Out of sync	Number of Control		2	2		
transmissio	OFDM symbols Aggregation level	CC	8	8		
n parameters	Ratio of	E dB	4	4		
parameters	hypothetical PDCCH RE energy to average CSI-RS RE energy	αв	4	4		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
	DCI format		1-0	1-0		
In sync	Number of Control OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	4	4		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			OFF	OFF		
Gap pattern	ID		[N.A.]	*[<i>gp0</i>]		
Layer 3 filter			Enabled	Enabled		

T310 timer		ms	0	0
T311 timer		ms	1000	1000
N310			1	1
N311			1	1
NZP CSI-RS co	onfiguration		[Resourceld 1]	[Resourceld 0]
ZP CSI-RS con	ZP CSI-RS configuation		TBD	TBD
CSI-IM configur	CSI-IM configuration		TBD	TBD
Periodic CSI re	Periodic CSI reporting		PUCCH	PUCCH
CSI reporting	Config 1, 2	slot	[5]	[5]
periodicity	Config 3		[10]	[10]
T1		S	1	1
T2	T2		0.4	0.4
T3	T3		[0.6]	
D1		S	[0.24]	[0.44]
Note 1: UE-s	pecific PDCCH is	not transn	nitted after T1 starts.	

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 3		Test 4			
			T1	T2	T3	T1	T2	T3	
PDCCH	_beta	dB		4			4		
PDCCH	_DMRS_bet	dB		4			4		
а									
PBCH_b	eta	dB							
PSS_be	ta	dB							
SSS_be	ta	dB		0		0			
PDSCH	_beta	dB							
OCNG_I	oeta	dB							
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	2 " 1		[-98]			[-98]			
1 oc	Config 2	15K		[-98]		[-98]			
	Config 3	Hz		[-98]		[-98]			
Propagation condition			[TD	DL-C 300ns 100)Hz]	[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.6.5.1.6.1-1.

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.6.5.1.6.1-3: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

	Test 4 Value							
	gapOffset	[0]						
Note 1:	ote 1: RLM RS is partially overlapped with							
	measurement gap							

Table A.6.5.1.6.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1	
	Value	Value	
frequencyD omainAlloca tion ^{Note 2}	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 2: nro	38.211 [6] table fRBs is derived nfiguration in Ta	based on the	

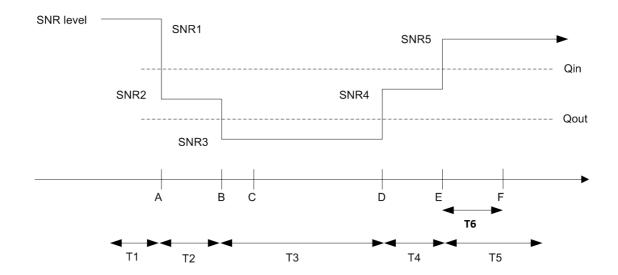


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

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 insync 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] or [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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 6.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth
2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth
3	TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth
Note: The UE is only requir	red 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

F	Parameter	Unit	Va	Value		
•	urumoto:		Test 5	Test 6		
Active PCell			Cell 1	Cell 1		
RF Channel Number			1	1		
Duplex mode			FDD	FDD		
	Config 2, 3		TDD	TDD		
TDD	Config 1		Not Applicable	Not Applicable		
Configuration			[TDDConf.1.1]	[TDDConf.1.1]		
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]		
CORESET	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]		
Reference	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]		
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]		
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC	Config 1, 2		FR1 patterm 1	FR1 patterm 1		
Configuration			FR1 patterm 2	FR1 patterm 2		
PDSCH/PDC	J ,		15 KHz	15 KHz		
H subcarrier spacing	Config 3		30 KHz	30 KHz		
csi-RS-Index RS	assigned as RLM		[0]	[0]		
OCNG parar	neters		TBD	TBD		
CP length			Normal	Normal		
	Matrix and Antenna		[2x2 Low]	[2x2 Low]		
Cornigulation	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	8	8		
parameters	Ratio of	dB	4	4		
paramotors	hypothetical PDCCH RE energy to average CSI-RS RE energy	GD.	-	7		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			640	640		
Gap pattern			[N.A.]	*[<i>gp0</i>]		
Layer 3 filter	ing		Enabled	Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
	configuration		[Resourceld 1]	[Resourceld 0]		
ZP CSI-RS configuation			TBD	TBD		
CSI-IM confi	guration		TBD	TBD		
	Periodic CSI reporting		PUCCH	PUCCH		
Periodic CSI	reporting					
	. •	slot		[5]		
CSI reporting	g Config 1, 2	slot	[5]	[5] [10]		
CSI reporting periodicity	. •		[5] [10]	[10]		
CSI reporting periodicity	g Config 1, 2	S	[5] [10] 1	[10] 1		
CSI reporting periodicity T1 T2	g Config 1, 2	S S	[5] [10] 1 0.4	[10] 1 0.4		
CSI reporting periodicity	g Config 1, 2	S	[5] [10] 1	[10] 1		

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 5			Test 6			
			T1	T2	T3	T1	T2	T3	
PDCCH	_beta	dB		4			4		
PDCCH	_DMRS_bet	dB		4			4		
а									
PBCH_b	eta	dB							
PSS_be	ta	dB							
SSS_be		dB							
PDSCH	_beta	dB							
OCNG_I	oeta	dB	0			0			
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	Config 1	dBm/	[-98]		[-98]				
1 voc	Config 2	15K		[-98]			[-98]		
	Config 3	Hz		[-98]			[-98]		
Propagation condition			[TD	L-C 300ns 100)Hz]	[TD	L-C 300ns 100)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 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.6.5.1.7.1-3: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode

	Test 6					
	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.6.5.1.7.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode

Field	Resourceld 0	Resourceld 1		
	Value	Value		
frequencyD omainAlloca tion ^{Note 1}	row1	row2		
startingRB	0	0		
nrofRBs	Note 2	Note 2		
Note 2: nro				

Table A.6.5.1.7.1-5: DRX-Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

Table A.6.5.1.7.1-6: TimeAlignmentTimer -Configuration for FR1 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field		Test 5	Test 6
i ieiu		Value	Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in	Config 1, 2	[sl5]	[sl5]
SchedulingRequestResourc eConfig	Config 3	[sl10]	[sl10]

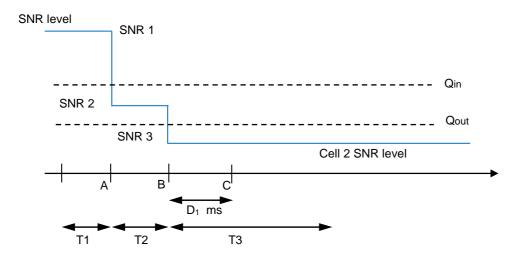


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

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 ($D_1 = [TBD]$ 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 Insync 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.6.5.1.8.1-4 below. There is one cells, cell 1 which 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 of [5] or [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 7.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
3	TDD duplex mode, 30kHz SSB SCS, 40MHz 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	lue	
			Test 7	Test 8
Active PCell			Cell 1	Cell 1
RF Channel	RF Channel Number		1	1
Duplex mode Config 1			FDD	FDD
	Config 2, 3		TDD	TDD
TDD	Config 1		Not Applicable	Not Applicable
Configuration	Config 2		[TDDConf.1.1]	[TDDConf.1.1]
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]
CORESET	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]
Reference	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]
Channel	Config 3		[CR. 2.1 TDD]	[CR. 2.1 TDD]
SSB	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
	Config 3		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)
SMTC	Config 1, 2		FR1 patterm 1	FR1 patterm 1
Configuration			FR1 patterm 2	FR1 patterm 2
PDSCH/PDC	CC Config 1, 2		15 KHz	15 KHz
H subcarrier	Config 3	-	30 KHz	30 KHz
spacing				
csi-RS-Index RS	assigned as RLM		[0]	[0]
OCNG parar	neters		TBD	TBD
CP length			Normal	Normal
Correlation N Configuration	Matrix and Antenna า		[2x2 Low]	[2x2 Low]
	DCI format		1-0	1-0
0	Number of Control		2	2
Out of sync transmissio	OFDM symbols Aggregation level	CC	8	8
n		Е		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
	DCI format		1-0	1-0
In sync	Number of Control OFDM symbols		2	2
transmissio	Aggregation level	cc	4	4
n	Datie of	E	^	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0
	DMRS precoder granularity		REG bundle size	REG bundle size
	REG bundle size		6	6
DRX			640	640
Gap pattern	ID		[N.A.]	*[<i>gp0</i>]
Layer 3 filter			Enabled	Enabled

T310 timer		ms	0	0	
T311 timer		ms	1000	1000	
N310			1	1	
N311			1	1	
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS configuation			TBD	TBD	
CSI-IM configuration			TBD	TBD	
Periodic CSI reporting			PUCCH	PUCCH	
CSI reporting C	Config 1, 2, 4, 5	slot	[5]	[5]	
periodicity C	Config 3, 6		[10]	[10]	
T1		S	1	1	
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		s	[0.24]	[0.44]	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

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 U		Unit	Test 7			Test 8		
			T1	T2	T3	T1	T2	T3
PDCCH	_beta	dB	4		4			
PDCCH	_DMRS_bet	dB		4		4		
а								
PBCH_b	eta	dB						
PSS_bet	ta	dB						
SSS_bet	ta	dB						
PDSCH	_beta	dB						
OCNG_b	oeta	dB		0			0	
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/	[-98]		[-98]			
1 voc	Config 2	15K	[-98]		[-98]			
	Config 3	Hz	[-98]				[-98]	
Propagation condition		[TD	[TDL-C 300ns 100Hz]		[TDL-C 300ns 100Hz]			
CONTUILIO	ı							

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.6.5.1.8.1-1.

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.6.5.1.8.1-3: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Test 8	
Field	Value	
gapOffset	[0]	
Note 1: RLM RS is partially overlapped with		
measurement gap		

Table A.6.5.1.8.1-4: NZP-CSI-RS resource configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1	
	Value	Value	
frequencyD omainAlloca tion ^{Note 1}	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.5.1.8.1-1			

Table A.6.5.1.8.1-5: DRX-Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table A.6.5.1.8.1-6: TimeAlignmentTimer -Configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

Field		Test 5 Value	Test 6 Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in SchedulingRequestResourc eConfig	Config 1, 2	[sl5]	[sl5]
	Config 3	[sl10]	[sl10]

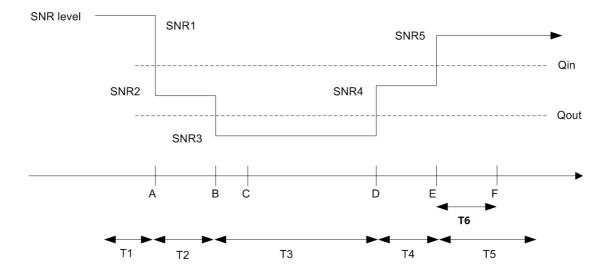


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

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.6.5.3 SCell Activation and Deactivation Delay

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 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 section 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, Table A. 6.5.4.1-2, Table A.6.5.4.1-3 and Table A.6.5.4.1-4 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: Supported test configurations

Configuration	PSCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode

7	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40MHz bandwidth, SUL duplex mode
Note: The U	JE is only required to be tested in one of the supported to	est configurations

Table A.6.5.4.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test configuration	Value	Comment
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, 5, 6, 7, 8, 9	Cell 1: FR1 PCell Cell 2: FR1 SCell	E-UTRAN PCell on RF channel number 1 FR1 SCell on RF channel number 2
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	
Т3	s	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.6.5.4.1-3: 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	Т3	T1	T2	T3		

	1		ı			1	_		
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	-	DD Conf.1	1	1	DD Conf.1.	1	
1 DD configuration		Conf 7, 8, 9		DD Conf.2			DD Conf.2.		
		Conf 1, 2, 3		$0: N_{RB,c} = $			0: $N_{RB,c} = 5$		
BW _{channel}	MHz	Conf 4, 5, 6		0: $N_{RB,c} = 3$			0: $N_{RB,c} = 5$		
DVV channel	IVII IZ			0: $N_{RB,c} = 3$			0: $N_{RB,c} = 3$		
PDSCH reference		Conf 7, 8, 9		SR.1.1 FDI					
		Conf 1, 2, 3					SR.1.1 FDD		
measurement		Conf 4, 5, 6		SR.1.1 TDI	J		SR.1.1 TDD	<u>'</u>	
channel as defined		Conf 7, 8, 9		SR 2.1 TDI	D		SR 2.1 TDD)	
in A.3.1.1		Comf 4 0 0		CD 4 4 EDI			OD 4 4 EDE	<u> </u>	
RMSI CORESET		Conf 1, 2, 3		CR.1.1 FD			CR.1.1 FDD		
reference		Conf 4, 5, 6		CR.1.1 TD	ט		CR.1.1 TDD)	
measurement		Conf 7, 8, 9		00 0 4 T D	_		00 0 4 T DD		
channel as defined				CR.2.1 TDI	D		CR.2.1 TDD)	
in A.3.1.2									
RMC CORESET		Conf 1, 2, 3		CR.1.1 FD			CCR.1.1 FDI		
reference		Conf 4, 5, 6	(CCR.1.1 TD)D		CCR.1.1 TDI	D	
measurement channel as defined		Conf 7, 8, 9	(CCR.2.1 TD	D		CCR.2.1 TDI	D	
in A.3.1.3		0							
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 FR	1		SSB.1 FR1		
		Conf 7, 8, 9		SSB.2 FR	1		SSB.2 FR1		
SMTC configuration		Conf 1, 2, 3, 4,		SMTC.1			SMTC.1		
DL initial BWP		5, 6, 7, 8, 9 Conf 1, 2, 3, 4,							
configuration		5, 6, 7, 8, 9		DLBWP.0.	1		DLBWP.0.1		
DL dedicated BWP		Conf 1, 2, 3, 4,		DLBWP.1.	1		DLBWP.1.1		
configuration UL dedicated BWP		5, 6, 7, 8, 9							
		Conf 1, 2, 3, 4,		ULBWP.1.	1		ULBWP.1.1		
configuration		5, 6, 7, 8, 9							
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 2 1							
PDCCH_DMRS	dB	Conf 1, 2, 3, 4,		0			0		
EPRE ratio of	1	5, 6, 7, 8, 9							
PDSCH_DMRS to									
SSS									
EPRE ratio of	1								
PDSCH to]								
PDSCH_DMRS									
EPRE ratio of	1								
OCNG DMRS to									
SSS									
EPRE ratio of									
OCNG to OCNG DMRS									
סוואוכס	dBm /	Conf 1, 2, 3, 4,	-102				-102		
	15kHz	5, 6, 7, 8, 9	-102			-102			
		Conf		-102		-102			
N_{oc} Note 2	dBm/	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,	16	16	16	16	16	16	
L _s /1V _{oc}	ub	5, 6, 7, 8, 9							

$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
33-KSKF	SCS	Conf 7,8,9	-83	-83	-83	-83	-83	-83
	dBm/ 9.36	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	MHz	.,=,0,.,0,0						
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.6.5.4.1-4: 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	Т3		

Channel number		Conf 1, 2, 3, 4, 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		
122 comigaration		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		
DUCCI I no no no et a no		Conf 1, 4, 7	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
PUSCH parameters for NR UL carrier		Conf 2, 5, 8	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
IOI NK OL Camei		Conf 3, 6, 9	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
PUCCH parameters		Conf 1, 4, 7	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
For NR UL carrier		Conf 2, 5, 8	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
		Conf 3, 6, 9	[TBD] [TBD] [TBD]	N/A [TBD] N/A		
PUSCH parameters		Conf 1, 4, 7	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
for supplementary		Conf 2, 5, 8	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
UL		Conf 3, 6, 9	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
PUCCH parameters		Conf 1, 4, 7	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
for supplementary		Conf 2, 5, 8	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
UL		Conf 3, 6, 9	N/A [TBD] N/A	[TBD] [TBD] [TBD]		
PDSCH reference		Conf 1, 4, 7	SR.1.1 FDD	SR.1.1 FDD		
measurement		Conf 2, 5, 8	SR.1.1 TDD	SR.1.1 TDD		
channel as defined in A.3.1.1		Conf 3, 6, 9	SR 2.1 TDD	SR 2.1 TDD		
RMSI CORESET		Conf 1, 4, 7	CR.1.1 FDD	CR.1.1 FDD		
reference		Conf 2, 5, 8	CR.1.1 TDD	CR.1.1 TDD		
measurement		Conf 3, 6, 9	CIX.1.1 TDD	OK.T.T TDD		
channel as defined		00111 0, 0, 0	CR.2.1 TDD	CR.2.1 TDD		
in A.3.1.2			- · · · · · · · · · · · · · · · · · · ·			
RMC CORESET		Conf 1, 4, 7	CCR.1.1 FDD	CCR.1.1 FDD		
reference		Conf 2, 5, 8	CCR.1.1 TDD	CCR.1.1 TDD		
measurement		Conf 3, 6, 9				
channel as defined			CCR.2.1 TDD	CCR.2.1 TDD		
in A.3.1.3						
OCNG Pattern Note 1		Conf 1, 2, 3	OP.1	OP.1		
000		Conf 1, 2, 4, 5,	SSB.1 FR1	SSB.1 FR1		
SSB configuration		7,8 Conf 3, 6, 9	SSB.2 FR1	SSB.2 FR1		
		Conf 1, 2, 3, 4,				
SMTC configuration		5, 6, 7, 8, 9	SMTC.1	SMTC.1		
DL initial BWP		Conf 1, 2, 3, 4,				
configuration		5, 6, 7, 8, 9	DLBWP.0.1	DLBWP.0.1		
DL dedicated BWP		Conf 1, 2, 3, 4,	DI DIMB 4 4	DI DIMB 4 4		
configuration		5, 6, 7, 8, 9	DLBWP.1.1	DLBWP.1.1		
UL dedicated BWP		Conf 1, 2, 3, 4,	LIL DIMP 4.4	LIL DIA/D 4.4		
configuration		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,	0	0		
EPRE ratio of	uБ	5, 6, 7, 8, 9		l o		
PDCCH to						
PDCCH_DMRS						
EPRE ratio of						
PDSCH_DMRS to						
SSS						
EPRE ratio of						
PDSCH to						
PDSCH_DMRS		ĺ				

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/ SCS	Conf 1, 2, 4, 5, 7,8	-102			-102		
	303	Conf 3, 6, 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, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	303	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
Io Note 3	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_{ac} 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.6.5.4.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within [20]ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within [20]ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within [20]ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within [20]ms 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.6.5.5 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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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

Cor	nfiguration	Description						
1		FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth						
2		TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth						
3		TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth						
Note:	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

Pa	Parameter		Val	ue	Comment		
		t	Test 1	Test 2			
Active P	Cell		Cell 1	Cell 1			
	nnel Number		1	1			
Duplex	Config 1		FDD	FDD			
mode	Config 2,		TDD	TDD			
TDD	Config 1		Not Applicable	Not Applicable			
Configu		ļ ļ	[TDDConf.1.1]	[TDDConf.1.1]			
ation	Config 3		[TDDConf.1.2]	[TDDConf.1.2]			
CORES ET	Config 1 Config 2		[CR. 1.1 FDD] [CR. 1.1 TDD]	[CR. 1.1 FDD] [CR. 1.1 TDD]			
Referen		 	[CR. 1.1 TDD]	[CR. 1.1 TDD]			
e Channel	a samig s		[010. 2.1 100]	[010. 2.1 100]			
SSB	Config 1		TBD (Note:	TBD (Note:			
Configu	,		periodicity is 20ms)	periodicity is 20ms)			
ation	ation Config 2		TBD (Note:	TBD (Note:			
			periodicity is 20ms)	periodicity is 20ms)			
	Config 3		TBD (Note:	TBD (Note:			
SMTC	Config 1,		periodicity is 20ms) FR1 patterm 1	periodicity is 20ms) FR1 patterm 1			
Configu	. 2		·				
ation	Config 3		FR1 patterm 2	FR1 patterm 2			
PDSCH/ PDCCH	2		15 KHz	15 KHz			
subcarri r spacin	g		30 KHz	30 KHz			
csi-RS-lassigned	ndex d as RLM RS		[0]	[0]			
	arameters		TBD	TBD			
CP leng			Normal	Normal			
Correlati Antenna Configui			[2x2 Low]	[2x2 Low]			
Configur	DCI format		1-0	1-0			
-	Number of		2	2			
Beam failure detect	Control OFDM symbols						
ion trans	Aggregation level	CC E	8	8			
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	0	0			
	energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0			
	DMRS precoder granularity		REG bundle size	REG bundle size			
	REG bundle size		6	6			
DRX			OFF	OFF			
Gap pat	tern ID		[N.A.]	*[<i>gp0</i>]			

ssb-Index			2	2	Number of SSB indexes used for beam failure detection
rlmInSync0 Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCont S	rolOffsetS		NA	NA	Used for deriving rsrp-ThresholdCSI-RS
beamFailui MaxCount	elnstance		n2	n2	see TS 38.321 [7], section 5.17
beamFailui Timer	beamFailureDetection Timer		pbfd4	pbfd4	see TS 38.321 [7], section 5.17
ZP CSI-RS configuatio			TBD	TBD	
CSI-IM con			TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y	Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	

Note 1: 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

Par	ameter	Unit		Test	1 and To	est 2			Test	1 and T	est 2	
				SS	B of set	q ₀		SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH_beta		dB			4			4				
PDCCH_DMRS_bet dB					4			4				
а												
PBCH_b	eta	dB										
PSS_beta dB												
SSS_be	ta	dB	0				0 0					
PDSCH	_beta	dB										
OCNG_I	oeta	dB										
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
1 voc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
Propagation condition				[TDL-0	C 300ns 1	100Hz]		[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.6.5.5.1.1-1.
- 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 [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 2
Field	Value
gapOffset	[0]

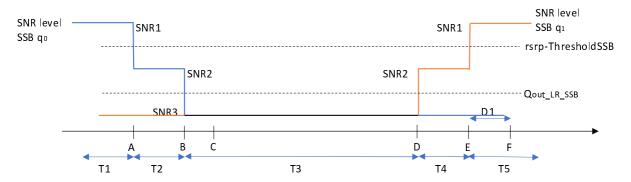


Figure A.6.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Config	guration	Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
3		TDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth				
Note: T	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

Test 1 Cell 1 C	Parameter		Uni	Value		Comment
RF Channel Number			t	Test 1	Test 2	
Duplex Config 1						
Mode 3				-		
STOP			-			
Configuration		3				
According Config 3 Config 2 Config 2 Config 2 Config 3 Config 2 Config 3 Config 3 Config 4 Config 2 Config 4 Config 5 Config 6 Config 7 Config 7 Config 7 Config 8 Config 8 Config 9 Config 1 Config 9 Config 1 Config 9						
CORES Config 1 Config 2 CR. 1.1 FDD CR. 1.1 TDD			-			
ET Config 2 Config 3 Config 3 Config 4 Config 4 Config 5 Config 7 Config 7 Config 7 Config 8 Config 9 Config 9 Config 9 TBD (Note: periodicity is 20ms) TBD (Note: periodicity is						
Referenc Config 3			-			
Channel SSB			-			
SSB	е			[010. 2.1 100]	[010. 2.1 100]	
Configuration				TRD (Note:	TRD (Note:	
Action						
Config 3						
SMTC Config 1, 2						
SMTC		Config 3				
Configuration						
PDSCH				FR1 patterm 1	FR1 patterm 1	
PDCCH 2	ation			FR1 patterm 2	FR1 patterm 2	
T spacing				15 KHz	15 KHz	
Csi-RS-Index assigned as RLM RS				30 KHz	30 KHz	
OCNG parameters	csi-RS-I	ndex		[0]	[0]	
CP length				TRD	TRD	
Correlation Matrix and Antenna						
Antenna						
DCI format 1-0						
Number of Control	Configu				4.0	
Beam failure detect ion trans mission n param eters energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size 6 6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5						
failure detect ion trans missio n param eters 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 freedom granularity REG bundle size freedom granularity REG bundle size for the following symbols and support freedom granularity freedom granulari	Beam			2	2	
detect ion frans Aggregation level E Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS REG bundle size REG bundle size REG bundle size REG bundle size DRX 640 640 640						
Itrans Ievel E		symbols				
missio n hypothetical PDCCH RE energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size for the process of t				8	8	
PDCCH RE			_	0	0	
eters energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy REG bundle size precoder granularity REG bundle size size REG bundle size feed and size feed are size DRX 640	n			-	-	
average CSI-RS RE energy Ratio of dB 0 0 hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS Precoder granularity REG bundle size DRX 640 640						
CSI-RS RE	eters					
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Size DRX 640 6						
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS Precoder granularity REG bundle size Size DRX 640 640						
hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX 640 640			dB	0	0	
DMRS				·		
energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size BEG bundle size 6 6 5 DRX 640 640		PDCCH				
average CSI-RS RE energy REG bundle size REG bundle size DMRS precoder granularity REG bundle size REG bundle size REG bundle size 6 6 DRX 640 640						
CSI-RS RE energy						
energy						
DMRS precoder granularity REG bundle size 6 6 size DRX REG bundle size REG bundle size						
precoder granularity REG bundle 6 6 DRX 640 640				REG bundle size	REG bundle size	
granularity						
DRX 640 640		granularity				
DRX 640 640				6	6	
	DRX	3. _ 3		640	640	
		tern ID				

ssb-Index			2	2	Number of SSB indexes used for beam failure detection
rlmInSync0 Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCont S	rolOffsetS		NA	NA	Used for deriving rsrp-ThresholdCSI-RS
beamFailur MaxCount	reInstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFailur Timer	eDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
ZP CSI-RS configuatio	ZP CSI-RS		TBD	TBD	
CSI-IM con			TBD	TBD	
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y	periodicit Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1
T2	T2		0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	

Note 1: 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

Par	ameter	Unit	Test 1 and T		1 and To	est 2			Test	1 and To	est 2	
			SSB of set q ₀					SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
PDCCH	_beta	dB			4					4		
PDCCH	_DMRS_bet	dB			4					4		
а												
PBCH_b	eta	dB										
PSS_bet	ta	dB										
SSS_bet	ta	dB			0					0		
PDSCH	_beta	dB										
OCNG_b	oeta	dB										
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
1 voc	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
	Propagation condition		agation [TDL-C 300ns 100Hz] [TDL-C 300ns 100Hz]				L 1					

- 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.6.5.5.2.1-1.
- 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 [A.3.6].

Table A.6.5.5.2.1-4: Measurement gap configuration for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Field	Test 2
rieid	Value
gapOffset	[0]

Table A.6.5.5.2.1-5: DRX-Configuration for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

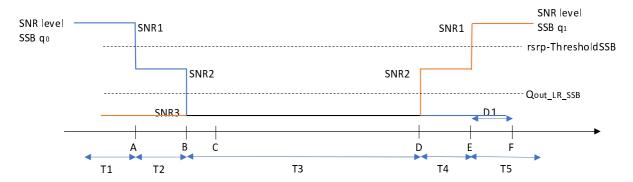


Figure A.6.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.6.5.5.3.1-3, A.6.5.5.3.1-4 and A.6.5.5.3.1-5 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.6.5.5.3.1-1 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 using GP ID #0 (40ms) in test 2.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description				
1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth				
3	FDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth				
4	TDD duplex mode, 30kHz SSB SCS, 40MHz 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

Call	Pa	Parameter		Val	Comment	
RF Channel Number			t	Test 1	Test 2	
RF Channel Number	Active F	Cell		Cell 1	Cell 1	
Material Configuents Material Configuents						
Not Applicable		Ouplex Config 1,		FDD	FDD	
Configur ation		Config 2,		TDD	TDD	
According 2				Not Applicable	Not Applicable	
Config 4 Config 2 Config 2 CR. 1.1 FDD] CR. 2.1 TDD] C	_			[TDDConf.1.1]	[TDDConf.1.1]	
CORES Config 2 CR. 1.1 FDD CR. 1.1 FDD A.3.1.2						
Reference Config 3 Config 4 CR. 2.1 FDD] CR. 2.1 TDD]	CORES				[CR. 1.1 FDD]	A.3.1.2
Config 4 Config 4 Config 2 SSB.1 FR1 SSB.2 F		Config 2				
Channel SSB SSB Config 1 Config 2 SSB FR1 SB FR1	Referen	C Config 3		[CR. 2.1 FDD]	[CR. 2.1 FDD]	
SSB	_	Config 4		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
Configuration				CCD 4 FD4	000 4 504	A 0 40
Ation						A.3.10
SSB.2 FR1 SSB.2 FR1 SSB.2 FR1 SSB.2 FR1						
SMTC	allon		_			
Configuration	CMTC					Λ 2 11
PDSCH/ Config 1, 15 KHz 15 KHz	Configu	r 2			-	A.3.11
PDCCH 2		4		-		
r spacing	PDCCH	2				
assigned as beam failure RS				30 KHz	30 KHz	
failure RS				[0]	[0]	
OCNG parameters						
CP length						
Correlation Matrix and Antenna						A.3.2.1
Antenna						
Configuration				[2x2 Low]	[2x2 Low]	
DCI format 1-0						
Beam failure detect symbols CC S S S S S S S S	Cornigu			1-0	1-0	
Beam failure detect ion trans mission n pypothetical param eters Elevel E energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX DRX OCOLOR 8 8 8 8 1 1 1 1 1 1 1 1 1 1				2		
failure detect ion trans missio n param eters Ratio of hypothetical PDCCH RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size REG bundle size precoder granularity REG bundle size OFF	Beam			_	_	
detect ion trans missio n level E Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS REG bundle size precoder granularity REG bundle size Size DRX OFF OFF						
ion trans missio n level E B O O O O O O O O O O O O O O O O O O		symbols				
missio n Param eters Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy To	ion		CC	8	8	
n 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						
PDCCH RE			dB	0	0	
eters 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 DRX PDC BRS RE REG bundle Size REG bundle Size OFF OFF						
average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS DMRS REG bundle size REG bundle size DRX O O O O O O O O O O O O O						
CSI-RS RE	CICIS	•••				
Ratio of dB 0 0 0						
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Size DRX OFF OFF						
hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX OFF OFF			dB	0	0	
PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX OFF OFF			45	· ·		
energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size BEG bundle size CFF REG bundle size BEG bundle size CFF OFF						
average CSI-RS RE energy DMRS precoder granularity REG bundle size DRX OFF OFF		DMRS				
CSI-RS RE energy		energy to				
energy						
DMRS precoder granularity REG bundle size 6 6 size DRX REG bundle size REG bundle size REG bundle size REG bundle size						
precoder granularity REG bundle 6 6 DRX OFF OFF				550: "	550: "	
granularity		_		REG bundle size	REG bundle size	
REG bundle size 6 6 DRX OFF OFF		•				
DRX OFF OFF				6	6	
DRX OFF OFF				Ö	Ö	
	DRX			OFF	OFF	
		tern ID				

csi-RS-Inde	ex		2	2	Number of SSB
					indexes used for
					beam failure
					detection
rlmInSyncC	OutOfSync		absent	absent	When the field is
Threshold					absent, the UE
					applies the value 0.
					(Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for
					$Q_{out_LR_SSB}$
powerCont	rolOffsetS		db0	db0	Used for deriving
S					rsrp-ThresholdCSI-
					RS
beamFailur	elnstance		n2	n2	see TS 38.321 [7],
MaxCount					section 5.17
beamFailureDetection			pbfd4	pbfd4	see TS 38.321 [7],
Timer	Timer		•		section 5.17
NZP CSI-R	NZP CSI-RS		[Resourceld 1]	[Resourceld 0]	
configuration	configuration		-		
ZP CSI-RS			TBD	TBD	
configuatio	n				
Periodic CS	SI reporting		PUCCH	PUCCH	
CSI	Config 1,	slot	[5]	[5]	
reporting	2				
periodicit	Config 3		[10]	[10]	
y	v				
T1	T1		1	1	During this time the
					the UE shall be fully
					synchronized to cell
					1
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	
Note 1:	JE-specific F	DCCH	is not transmitted after	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

Par	ameter	Unit	Test 1 and Test 2		Test 1 and Test 2							
			CSI-RS of set q₀			CSI-	RS of se	et q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
	tio of PSS	dB										
to SSS	·: (DD011	ID.										
	tio of PBCH	dB										
DMRS to	tio of PBCH	dB										
to PBCH		uБ										
EPRE ra		dB										
	DMRS to											
SSS												
EPRE ra	tio of	dB										
	to PDCCH											
DMRS					0					0		
EPRE ra		dB			Ū					· ·		
SSS	DMRS to											
EPRE ra	tio of	dB										
	to PDSCH	ub										
DMRS	10 1 20011											
	tio of OCNG	dB										
	SSS(Note											
1)												
	tio of OCNG	dB										
to OCNO	B DMRS											
(Note 1) SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2	uБ	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
01110	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3.7	Config 1	dBm/	IBD	IBD	[-98]	IDD	IDD	IBD	IDD	[-98]	ופט	ופט
N_{oc}	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS-		dBm			[20]					[20]		
RSRP		/SC										
Note 3		S										
Ês/lot												
Ês/Noc		ID /						ļ				
lo	config 1, 2	dBm/										
		9.36 MHz										
	Config 3,	dBm/										
	Corning 3,	38.1										
	'	MHz										
Propaga	tion			Γ	TDLC300)]			Γ	TDLC300	0]	
condition	1			•		-			•		-	
Note 1:	OCNG shal	l be use	d such th	at the res	ources in	Cell 1 a	re fully al	located a	nd a cons	tant tota	l transmit	ted

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.5.5.3.1-4: Measurement gap configuration for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 2
rieiu	Value
gapOffset	[0]

Table A.6.5.5.3.1-5: NZP-CSI-RS resource configuration for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field		Resourceld 0	Resourceld 1	
		Value	Value	
frequency omainAllo tion ^{Note}	ca	row1	row2	
startingR	RB	0	0	
nrofRBs	S	Note 2	Note 2	
Note 1: Note 2:				

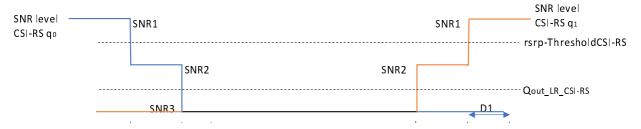


Figure A.6.5.5.3.1-1: SNR variation SSB for CSI-rs-based beam failure detection and link recovery testing in non-DRX mode

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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.6.5.5.4.1-4, A.6.5.5.4.1-5 and A.x.x.1.4.1-6 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10MHz bandwidth			
3	FDD duplex mode, 30kHz SSB SCS, 40MHz bandwidth			
4	TDD duplex mode, 30kHz SSB SCS, 40MHz 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		Uni	Va	lue	Comment
		t	Test 1	Test 2	
Active P	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1, 3		FDD	FDD	
	Config 2, 4		TDD	TDD	
TDD Configur	Config 1,		Not Applicable	Not Applicable	
ation	Config 2		[TDDConf.1.1]	[TDDConf.1.1]	
	Config 3		[TDDConf.1.2]	[TDDConf.1.2]	
CORES	Config 1		[CR. 1.1 FDD]	[CR. 1.1 FDD]	A.3.1.2
ET	Config 2		[CR. 1.1 TDD]	[CR. 1.1 TDD]	
Referen			[CR. 2.1 FDD]	[CR. 2.1 FDD]	
e Channel	Config 4		[CR. 2.1 TDD]	[CR. 2.1 TDD]	
SSB	Config 1		SSB.1 FR1	SSB.1 FR1	A.3.10
Configur] [SSB.1 FR1	SSB.1 FR1	
ation	Config 3		SSB.2 FR1	SSB.2 FR1	A.3.11
	Config 4		SSB.2 FR1	SSB.2 FR1	
SMTC Configur	Config 1,		FR1 patterm 1	FR1 patterm 1	
ation	Config 3,		FR1 patterm 2	FR1 patterm 2	
PDSCH/ PDCCH	2		15 KHz	15 KHz	
subcarrie r spacine	g 4		30 KHz	30 KHz	
csi-RS-la assigned Failure F	d as Beam		[0]	[0]	
	arameters		TBD	TBD	A.3.2.1
CP lengt			Normal	Normal	
Correlati Antenna Configur			[2x2 Low]	[2x2 Low]	
Cornigui	DCI format		1-0	1-0	
-	Number of		2	2	
Beam failure detect	Control OFDM symbols		2	2	
ion trans	Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
-	DMRS precoder granularity		REG bundle size	REG bundle size	
DBY	REG bundle size		6	6	
DRX	torn ID		640 [N. A.]	640 *[and]	
Gap pat	פווו ווט		[N.A.]	*[<i>gp0</i>]	

csi-RS-Index			2	2	Number of SSB indexes used for beam failure detection
rlmInSync0 Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCont S	rolOffsetS		db0	db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailui MaxCount	reInstance		[n2]	[n2]	see TS 38.321 [7], section 5.17
beamFailui Timer	beamFailureDetection Timer		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	NZP CSI-RS configuration		[Resourceld 1]	[Resourceld 0]	
	ZP CSI-RS configuation		TBD	TBD	
Periodic C	SI reporting		PUCCH	PUCCH	
CSI reporting	Config 1, 2	slot	[5]	[5]	
periodicit y	Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	
Note 1:	UE-specific F	PDCCH	is not transmitted after	T1 starts.	

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

Par	ameter	Unit	it Test 1 and Test 2 Test 1 and Test		est 2							
				CSI-RS of set q₀				RS of se				
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS	tit DDOLL	-ID										
DMRS to	tio of PBCH	dB										
	tio of PBCH	dB										
to PBCH		ab										
EPRE ra		dB										
	DMRS to											
SSS												
EPRE ra		dB										
	to PDCCH											
DMRS	·: f	-ID			0					0		
EPRE ra	tio of DMRS to	dB										
SSS	DIVING 10											
EPRE ra	tio of	dB										
	to PDSCH	<u> </u>										
DMRS												
	tio of OCNG	dB										
	SSS ^(Note 1)											
	tio of OCNG	dB										
to OCNG	DMRS (Note											
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2	ab	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
00	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
λ7	Config 1	dBm/	100	וטט	[-98]	וטט	וטט	100	טטו	[-98]	טטו	טטו
N_{oc}	Config 2	15K			[-98]					[-98]		
	Config 3	Hz			[-98]					[-98]		
SS-	3 -	dBm			1							
RSRPN		/SC										
ote 3		S										
Ês/lot												
Ês/Noc		4D/										
lo	config 1, 2	dBm/ 9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propaga				[TDLC300)]			[TDLC300)]	
condition												
Note 1.		I ha uca	d cuch th	at tha rac	ources in	رد 1 الم ^ص ر	ra fullv all	lacated a	nd a cons	tant total	l tranemit	tad

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.5.5.4.1-4: Measurement gap configuration for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Test 2		
rieid	Value		
gapOffset	[0]		

Table A.6.5.5.4.1-5: NZP-CSI-RS resource configuration for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field		Resourceld 0	Resourceld 1
		Value	Value
frequencyl omainAlloc tion ^{Note 1}		row1	row2
startingRE	3	0	0
nrofRBs		Note 2	Note 2
Note 2:	nro Co	38.211 [6] table fRBs is derived of figuration in Ta	based on the

Table A.6.5.5.4.1-6: DRX-Configuration for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable



Figure A.6.5.5.4.1-1: SNR variation SSB 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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 delay

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

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 section 8.6, and interruption requirement on other active serving cell defined in section 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 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 PCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than 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 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 PCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the SCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than 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, 10MHz bandwidth, FDD -FDD duplex mode				
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD – TDD duplex mode				
3	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD – FDD duplex mode				
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD – TDD duplex mode				
5	NR 30kHz SSB SCS, 40MHz 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		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 SCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	ub	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 2	uБ	O	
Cell2 timing offset to cell1		3	Time alignment error as specified in TS
	μs	3	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

Paran	neter	Unit	Cell 1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5	」	TDD	TDD
	Config 3	<u> </u>	TDD	FDD
	Config 4		FDD	TDD
TDD configuration	Config 1	<u> </u>	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
BW _{channel}	Config 1,2,3,4		10 MHz: $N_{RB,c} = 52$	10 MHz: N _{RB,c} = 52
	Config 5	1	40 MHz: N _{RB,c} = 106	40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2	3
Initial BWP Configurat	ion		DLBWF	P.0.2 ^{Note4}
Active BWP-1 Configu			DLBWP.1.1 ^{Note4}	-
Active BWP-2 Configu			DLBWP.1.3 ^{Note4}	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel]	SR.1.1 TDD	SR.1.1 TDD
	Config 3	1	SR.1.1 TDD	SR.1.1 FDD
	Config 4]	SR.1.1 FDD	SR.1.1 TDD
	Config 5	1	SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2	1	CR.1.1 TDD	CR.1.1 TDD
	Config 3	1	CR.1.1 TDD	CR.1.1 FDD
	Config 4	1	CR.1.1 FDD	CR.1.1 TDD
	Config 5	╡	CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET		1	CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2	1	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3	1	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	1	+		P.1
SSB Configuration	Config 1,2,3,4	+		1 FR1
- J- Comigaration	Config 5	┥ ├	SSB.2 FR1	
SMTC Configuration	1	+	SMTC.1	
Correlation Matrix and	Antenna	+		Low
Configuration			IXE	
EPRE ratio of PSS to	SSS	dB		
EPRE ratio of PBCH [1 - 1		
EPRE ratio of PBCH to		╡		
EPRE ratio of PDCCH		╡		
EPRE ratio of PDCCH		╡		
EPRE ratio of PDSCH		╡	0	0
EPRE ratio of PDSCH		╡	ŭ	Ĭ
EPRE ratio of OCNG		╡		
1)	DIVINCE TO COO(INCIG			
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
N _{oc} Note 2	Config 1,2,3,4	dBm/SCS	[-104]	[-104]
	Config 5	1	[-110]	[-110]
N _{oc} Note 2		dBm/15KH	[-104]	[-104]
SS-RSRP Note 3	Config 4 0 0 4	Z dDm/CCC	[07]	[0.7]
22-K2KL More 2	Config 1,2,3,4 Config 5	dBm/SCS	[-87] [-90]	[-87] [-90]
Ês/I _{ot}	Corning o	dB	[-90] [17]	[17]
		dB		
F/N		dBm/	[17] [-59]	[17] [-59]
Ê _s /N _{oc}		udill/	1-091	[-59 <u>]</u>
E _s /N _{oc} Io ^{Note3}	Config 1,2,3,4			
	Config 1,2,3,4 Config 5	9.36MHz dBm/ 38.16MHz	[-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 TS 38.213 [3] section 12.

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for SCell in a slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK for SCell in a 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 Section 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 a 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.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

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 section 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 bandwidth part configuration BWP-2, 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 at PCell's slot (i+X) as defined in section 8.6 and starts to report valid ACK/NACK for the PCell no later than at slot (i+X+kI). The UE shall be continuously scheduled on PCell's BWP-2 starting from slot (i+X).

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the RRC Reconfiguration message including BWP switch command is received till an ACK 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, 10MHz bandwidth, FDD duplex mode			
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
6	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
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.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

Paramet	er	Unit	Cell 1
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
DVV channel	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6		40 MHz: N _{RB,c} = 32
Active BWP ID	Corning 5,0		1, 2
Initial BWP	Config 1,4		DLBWP.0.2
		-	DLBWF.U.2
Configuration	Config 2,5	-	
A (i DIA/D o	Config 3,6		NI A
Active BWP-0	Config 1,4		NA
Configuration	Config 2,5		
	Config 3,6		
Active BWP-1	Config 1,4		DLBWP.1.3
Configuration	Config 2,5		
	Config 3,6		
Active BWP-2	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		
	Config 3,6		
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6]	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
'	Config 3,6		CR2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
Paramatana	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
CCB Comigaration	Config 3,6		SSB.2 FR1
SMTC Configuration	Coming 0,0		SMTC.1
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS	to SSS	u u u	Ü
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			
EPRE ratio of PDCCH to PD	OCCH DMRS		
EPRE ratio of PDSCH DMR	S to SSS		
EPRE ratio of PDSCH to PD			
EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OCI	NG DMRS (Note 1)		
Noc ^{Note 2}		dBm/15	[-104]
OO DODD Note 2		kHz	
SS-RSRP Note 3		dBm/15	[-87]
Ê _s /I _{ot}		kHz dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}		dBm/	TBD
10	Config 1,2,4,5	9.36MHz	טטו
0 " 00		dBm/	TBD
	Config 3,6	38.16MHz	

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:	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 TS 38.213 [3] section 12.

A.6.5.6.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PCell in a slot (i+X+kI).

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%.

NOTE: During T1, if there are no uplink resources for reporting the ACK in a slot (i+X+kI), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of X, k1 for type 1 and type 2 UE.

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 intrafrequency cell search requirements in clause 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

С	Configuration	Description
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired 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 configur	Value	Comment
		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 pattern 2	
		2	SMTC pattern 1	
		3	SMTC pattern 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 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.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test	Ce	II 1	Ce	II 2
		configuration	T1	T2	T1	T2
TDD configuration		1	TDDC	onf.3.1	TDDC	onf.3.1
		2		/A	N/A	
		3		TDDConf.3.1		onf.3.1
PDSCH RMC		1	SR.1.	1 FDD	N.	/A
configuration		2	SR.1.	1 TDD		
		3	SR.2.	1 TDD	1	
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		.1 TDD		.1 TDD
configuration		3		.1 TDD		.1 TDD
OCNG Patterns		1, 2, 3		P.1		
Intial BWP		1, 2, 3		 WP.0	OP.1 DLBWP.0	
configuration		1, 2, 0	ULBWP.0		ULBWP.0	
Active DL BWP		1, 2, 3	DLBWP.1		DLBWP.1	
configuration		., _, =				
Active UL BWP		1, 2, 3	ULB'	WP.1	ULB\	WP.1
configuration						
RLM-RS		1, 2, 3	SSB		SSB	
$N_{oc}^{}$ Note 2	dBm/SCS	1	-98			
- voc		2	-98		98	
		3	-95			
N_{oc} Note 2	dBm/15 KHz	1	-98			
1 voc		2				
		3				
${ m \hat{E}}_{_{ m s}}/{ m I}_{_{ m ot}}$	dB	1	4	-1.46	-Infinity	-1.46
-s/ ot	,	2	_			
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
ST OC	,	2	_			
OO DODD Note 2	ID (0.00 L(1)	3	0.4	0.4		
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94
		2 3	-94	-94	-Infinity	-94
lo	dBm/9.36 MHz		-91 64.60	-91 -62.25	-Infinity	-91 -62.25
lo	dBm/9.36 MHz	1 2	-64.60 -64.60	-62.25 -62.25	-Infinity -Infinity	
	dBm/9.36 MHz	3	-64.60 -58.50	-62.25 -56.16	-Infinity -Infinity	-62.25 -56.16
Propagation	UDITI/30.10 IVITIZ	1, 2, 3	-56.50		VGN	-50.16
Condition		1, 4, 3		Av	VGIN	
Condition						

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.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 intrafrequency cell search requirements in clause 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.6.6.1.2.1-1, A.6.6.1.2.1-2, A.6.6.1.2.1-3 and A.6.6.1.2.1-4 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.6.6.1.2.2-1: Supported test configurations

	Configuration	Description
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only red	quired 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 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 Cell 2		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC pattern	1 2	
		2	SMTC pattern	n 1	
		3	SMTC pattern	n 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	ms	1, 2, 3	40	640	
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving		1	3 μs		Synchronous cells
and neighbour cells		2	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.6.6.1.2.1-2: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Ce	II 1	Ce	II 2
		configuration	T1	T2	T1	T2
TDD configuration		1	TDDC	onf.3.1	TDDC	onf.3.1
		2	N/A		N/A	
		3		onf.3.1	TDDC	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A
configuration		2	SR.1.	1 TDD		
		3	SR.2.	1 TDD	1	
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	CCR.1	
CORESET RMC		2		.1 TDD		.1 TDD
configuration		3		.1 TDD	CCR.2	
OCNG Patterns			OF			
Intial BWP		1, 2, 3 1, 2, 3			OP.1 DLBWP.0	
configuration		1, 2, 0	DLBWP.0 ULBWP.0		ULBWP.0	
Active DL BWP		1, 2, 3	DLBWP.1		DLBWP.1	
configuration		., _, 0				
Active UL BWP		1, 2, 3	ULB\	WP.1	ULB\	NP.1
configuration						
RLM-RS		1, 2, 3	SSB		SS	SB
N_{oc} Note 2	dBm/SCS	1	-98			
1 voc		2		-	98	
		3	-95			
$N_{oc}^{$	dBm/15 KHz	1	-98			
oc oc		2				
		3				
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	dB	1	4	-1.46	-Infinity	-1.46
-s/ ot	,	2				
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
s i oc		2				
OO DODD Note 3	ID (000 K)	3	0.4	0.4	1 6 4	0.4
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94 04
lo	dBm/9.36 MHz	<u>3</u> 1	-91 -64.60	-91 -62.25	-Infinity -Infinity	-91 -62.25
10	dBm/9.36 MHz	2	-64.60	-62.25 -62.25	-Infinity -Infinity	-62.25 -62.25
	dBm/38.16 MHz	3	-58.50	-62.25 -56.16	-Infinity	-62.25 -56.16
Propagation	UDITI/OU. TO IVILIZ	1, 2, 3	-30.30		VGN	-30.10
Condition		1, 2, 0		AV	V () V	
Condition			l			

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.6.6.1.2.1-4: DRX-Configuration for SA intra-frequency event triggered reporting with gaps for PCell in FR1

Field	Test1	Test2	Comment
rieid	Value	Value	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	Sf640	
shortDRX	disable	disable	

Table A.6.6.1.2.1-5: *TimeAlignmentTimer* -Configuration for SA intra-frequency event triggered reporting with gaps for PCell in FR1

Field	Test1	Test2	Comment
Field	Value	Value	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

A.6.6.1.2.2 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.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 intrafrequency 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, 10MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only re	equired 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 pattern 2	
		2	SMTC pattern 1	
		3	SMTC pattern 1	
CSI-RS parameters		1	TBD	
		2	TBD	
		3	TBD	
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 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.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	Cell 1		Cell 2		
		configuration	T1	T2	T1	T2	
TDD configuration		1	TDDC	onf.3.1	TDDC	TDDConf.3.1	
		2		N/A		N/A	
		3		onf.3.1	TDDC		
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	OI	P.1	OP.1		
Intial BWP		1, 2, 3	DLB	WP.0	DLBWP.0		
configuration			ULBWP.0		ULBWP.0		
Active DL BWP		1, 2, 3	DLBWP.2		DLBWP.1		
configuration							
Active UL BWP		1, 2, 3	ULB	WP.1	ULB\	NP.1	
configuration			001.00		000		
RLM-RS		1, 2, 3	CSI-RS		SSB		
N_{oc} Note 2	dBm/SCS	1			-98		
00		2			-98		
		3	-95				
$N_{oc}^{$	dBm/15 KHz	1	-98				
OC .		2	_				
		3					
\hat{E}_{s}/I_{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 i oc		2	_				
N-1-0		3					
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
la .	dD/0.00.041.1-	3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-Infinity	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-Infinity	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-Infinity	-56.16	
Propagation Condition		1, 2, 3		AV	VGN		

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.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.6.6.1.4.1-1, A.6.6.1.4.1-2, A.6.6.1.4.1-3 and A.6.6.1.4.1-4 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.

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.6.6.1.4.2-1: Supported test configurations

С	onfiguration	Description			
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configur	Va	lue	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	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 pattern		
		2	SMTC pattern		
		3	SMTC pattern	<u>1</u>	
CSI-RS parameters		1	TBD		
		2	TBD		
		3	TBD		
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	T	L3 filtering is not used
DRX	ms	1, 2, 3	40	640	
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.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	Cell 1		Cell 2		
		configuration	T1	T2	T1	T2	
TDD configuration		1	TDDConf.3.1		TDDConf.3.1		
		2	N/A		N/A		
		3	TDDC		TDDConf.3.1		
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD	1		
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		.1 TDD		.1 TDD	
configuration		3		.1 TDD	CCR.2		
OCNG Patterns		1, 2, 3		P.1			
Intial BWP		1, 2, 3		 WP.0	OP.1 DLBWP.0		
configuration		1, 2, 0	ULBWP.0		ULBWP.0		
Active DL BWP		1, 2, 3	DLBWP.2		DLBWP.1		
configuration		., _, -					
Active UL BWP		1, 2, 3	ULBWP.1		ULB\	NP.1	
configuration							
RLM-RS		1, 2, 3	CSI-RS		SS	SSB	
$N_{oc}^{}$ Note 2	dBm/SCS	1		-	·98		
· oc		2	-98				
		3	-95				
$N_{oc}^{}$ Note 2	dBm/15 KHz	1			·98		
1 voc		2					
		3			_		
${ m \hat{E}}_{_{ m s}}/{ m I}_{_{ m ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
s / Tot		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
s i oc	,	2	_				
OO DODD Note 2	ID (000 I/II	3	0.4	0.4		0.4	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	3 1	-91 -64.60	-91 -62.25	-Infinity -Infinity	-91 -62.25	
IU	dBm/9.36 MHz	2		-62.25 -62.25	-Infinity	-62.25 -62.25	
	dBm/38.16 MHz	3	-64.60 -58.50	-62.25 -56.16	-Infinity	-62.25 -56.16	
Propagation	UDITI/30. TO IVITIZ	1, 2, 3	-30.30		VGN	-50.10	
Condition							
Condition							

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: DRX-Configuration for SA intra-frequency event triggered reporting with gaps for TDD PCell in FR1

Field	Test1	Test2	Comment
rieid	Value	Value	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	Sf640	
shortDRX	disable	disable	

Table A.6.6.1.4.2-5: *TimeAlignmentTimer* -Configuration for SA intra-frequency event triggered reporting with gaps for TDD PCell in FR1

Field	Test1	Test2	Comment
Field	Value	Value	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

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.6.6.1.5.1-1 and A.6.6.1.5.1-2 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.6.6.1.5.2-1: Supported test configurations

Configuration		Description
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

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 pattern 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 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.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	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							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration OCNG Patterns		1	01	0.1	0	2.1	
Intial BWP		1		OP.1		OP.1 DLBWP.0	
configuration		'	DLBWP.0 ULBWP.0		ULBWP.0		
Active DL BWP		1		DLBWP.1		DLBWP.1	
configuration		'	DLBWF.I		/VI . I		
Active UL BWP		1	ULB	WP.1	ULB\	NP.1	
configuration		·					
RLM-RS		1	S	SSB SSB		SB	
N_{oc} Note 2	dBm/SCS	1		-98			
Noc 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}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS KHz	1	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	1	-64.60			-62.25	
Propagation		1		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 $N_{\rm ec}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.5.3 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.6.6.1.6.1-1 and A.6.6.1.6.1-2 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.6.6.1.6.2-1: Supported test configurations

Configuration		Description
1		15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
Note:	The UE is only re-	quired to be tested in one of the supported test configurations.

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 pattern 2	
CSI-RS parameters		1	TBD	
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 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.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 T1 T2		II 2	
		configuration	T1			T2	
TDD configuration		1	N	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							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration			1				
OCNG Patterns		1		P.1		P.1	
Intial BWP		1		DLBWP.0		DLBWP.0	
configuration				ULBWP.0		ULBWP.0	
Active DL BWP		1	DLB	DLBWP.2		DLBWP.1	
configuration							
Active UL BWP		1	ULBWP.1 ULBWP.1		WP.1		
configuration							
RLM-RS	· - /0.00	1	CSI-RS 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	4 -1.46		-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	-Infinity	-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 $N_{\rm ec}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.6.3 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..

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	Config Description				
1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3	NR 30kHz SSB SCS, 40MHz 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 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	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 (Pcell)		NR cell 1 (Pcell)		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	19			
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		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	TBD	TBD			

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	Cell 1		Cell 2		
			configuratio n	T1	T2	T1	T2	
	NR RF Channel Number		Config 1,2,3		1		2	
Duplex mod	e		Config 1			DD	·	
TDD ('	.,		Config 2,3			<u>rdd</u>		
TDD configu	ıratıon		Config 1			pplicable		
			Config 2 Config 3			Conf.1.1 Conf.2.1		
BW _{channel}		MHz	Config 1,2			$I_{RB,c} = 52$		
onamici		.,,,,,,	Config 3			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					WP.0.1		
configurati on	Dedicated DL BWP		Config 1, 2,		DLB	WP.1.1		
	Dedicated UL BWP		-		ULB	WP.1.1		
A.3.2.1.1 (O			Config 1,2,3	OI	P.1)P.1	
PDSCH Ref			Config 1	SR.1.	1 FDD		-	
measureme	nt channel		Config 2	SR.1.	1 TDD]		
			Config 3		1 TDD	<u> </u>		
CORESET	Reference		Config 1	CR.1.	1 FDD		-	
Channel			Config 2		1 TDD]		
OMTO "			Config 3	CR2.	1 TDD			
	guration defined and A.3.11. 2		Config 1		SN	/ITC.2		
			Config 2, 3	SMTC.1				
PDSCH/PD/ spacing	CCH subcarrier	kHz	Config 1,2 Config 3	15 30				
	of PSS to SSS							
EPRE ratio	of PBCH DMRS			0				
	of PBCH to PBCH							
	of PDCCH DMRS							
	of PDCCH to		Config 1,2,3				0	
	of PDSCH DMRS							
PDSCH	of PDSCH to							
	of OCNG DMRS							
to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
		dBm/15 kHz			-98			
N oc Note2		dBm/S CS	Config 1,2 Config 3	-98 -95				
SS-RSRP No	ote 3	dBm/S CS	Config 1,2 Config 3	-94 -91	-94 -91	-Infinity -Infinity	-91 -88	
\hat{E}_{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	4	-Infinity	7	
Io ^{Note3}		dBm/9. 36MHz	Config 1,2	-67.11	-67.11	-Infinity	-65.38	
		dBm/38 .16MHz	Config 3	-62.27	-62.27	-Infinity	-61.06	
Propagation	Condition		Config 1,2,3		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 $_{N_{-\infty}}$ 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.

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 [TBD] 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 [TBD] 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.

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, 10MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
3		NR 30kHz SSB SCS, 40MHz 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 has the same SCS, BW and duplex mode as NR serving cell					

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		2		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
		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	DRX is 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	TBD	TBD	TBD	TBD	

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		Ce	II 1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Chanr	nel Number		Config 1,2,3		1		2	
Duplex mode			Config 1		F	DD		
			Config 2,3			TDD		
TDD configur	ation		Config 1			pplicable		
			Config 2 Config 3			Conf.1.1 Conf.2.1		
BW _{channel}		MHz	Config 1,2			RB,c = 52		
D V chamer			Config 3			RB,c = 02		
BWP BW		MHz	Config 1,2		10: N	RB,c = 52		
	T		Config 3			RB,c = 106		
BWP configuratio	Initial DL BWP		Config 1, 2, 3			WP.0.1		
n	Dedicated DL BWP				DLB	WP.1.1		
	Dedicated UL BWP				ULB	WP.1.1		
OCNG Patter			Config 1,2,3					
A.3.2.1.1 (OP	2.1)		-		P.1	C)P.1	
PDSCH Refe			Config 1		1 FDD		-	
measuremen	t channel		Config 2		1 TDD			
0005057.0	,		Config 3		1 TDD			
CORESET R	eterence		Config 1 Config 2		1 FDD 1 TDD		-	
Oname			Config 3		1 TDD 1 TDD			
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	<u> </u>	SMTC.2			
			Config 2, 3		SMTC.1			
PDSCH/PDC	PDSCH/PDCCH subcarrier		Config 1,2		15			
spacing			Config 3		30			
EPRE ratio of	EPRE ratio of PSS to SSS							
EPRE ratio of to SSS	PBCH DMRS							
EPRE ratio of	PBCH to PBCH							
DMRS	EDDCCH DMDC							
EPRE ratio of PDCCH DMRS to SSS				0				
EPRE ratio of PDCCH DMR	EPRE ratio of PDCCH to		Config 1,2,3				0	
EPRE ratio of PDSCH DMRS			3					
to SSS EPRE ratio of PDSCH to								
PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG DMRS								
N Note2		dBm/15 kHz	Config 1,2,3		-98			
Note2	N oc Note2		Config 1,2		-98			
SS-RSRP Note	3	CS dBm/S	Config 3 Config 1,2	-94	-94	-95 -Infinity	-91	
JO KOKE		CS	Config 1,2	-9 4 -91	-9 4 -91	-Infinity	-88	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		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.	Config 1,2	-67.11	-67.11	-Infinity	-65.38	
		36MHz dBm/38	Config 3	-62.27	-62.27	-Infinity	-61.06	
		.16MHz	2 2	·				

Propagat	tion Condition	Config 1,2,3 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_{∞} to be							
	fulfilled.							
Note 3:	SS-RSRP and lo leve are not settable para			other parameters for information purposes. They				
Note 4:		•	ts are specified	assuming independent interference and noise at				
	each receiver antenn	a 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	Test2&4	Comment
Field	Value	Value	
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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.3.1 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 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.6.6.2.3.1-1, A.6.6.2.3.1-2 and A.6.6.2.3.1-3.In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.3.1-2 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.6.6.2.3.1-2 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 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. 6.6.2.3.1-1 SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description
1		NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40MHz 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 cell has	s the same SCS, BW and duplex mode as NR serving cell

Table A. 6.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Number Config 1,2,3 NR cell 1 (Pcell) NR Cell 1 is on NR RF channel number 1.	Parameter	Unit	Test	Va	alue	Comment		
NR RF Channel Number Config 1,2,3 1, 2 Two FR1 NR carrier frequencies used.				Test 1	Test 2			
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 2 As specified in clause 9.1.2-1. Measurement gap 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 Hysteresis dB Config 1,2,3 -6 Hysteresis dB Config 1,2,3 0 CP length Config 1,2,3 0 Config 1,2,3 0 Eliter coefficient DRX Config 1,2,3 OFF DRX is not used Time offset between serving and neighbour cells Config 2,3 3µs Synchronous cells.				1	, 2	Two FR1 NR carrier frequencies is used.		
Config 1,2,3 O 2 As specified in clause 9.1.2-1.	Active cell		Config 1,2,3	NR cell 1 (Pc	ell)			
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 Config 2 SSB.1 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 DRX Config 1,2,3 OFF Time offset between serving and neighbour cells Config 1 3ms Time offset between serving and neighbour cells Config 2,3 3μs Config 2,3 Synchronous cells.	Neighbour cell		Config 1,2,3	NR cell2				
offsetSMTC-SSB parametersConfig 1SSB.1 FR1As specified in clause A.3.10.1Config 2SSB.1 FR1As specified in clause A.3.10.1A3-OffsetdBConfig 1,2,3-6HysteresisdBConfig 1,2,30CP lengthConfig 1,2,3NormalTimeToTriggersConfig 1,2,30L3 filtering is not usedDRXConfig 1,2,3OFFDRX is not usedTime offset between serving and neighbour cellsConfig 13msAsynchronous cells.The timing of Cell 2 is 3ms later than the timing of Cell 1.Config 2,33μsSynchronous cells.	Gap Pattern Id		Config 1,2,3	0	2	As specified in clause 9.1.2-1.		
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 DRX Config 1,2,3 OFF DRX is not used Time offset between serving and neighbour cells Config 2,3 3µs Synchronous cells. Config 2,3 3µs Synchronous cells.			Config 1,2,3	39	39			
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 DRX Config 1,2,3 OFF DRX is not used Time offset between serving and neighbour cells Config 2,3 3µs Synchronous cells. Config 2,3 3µs Synchronous cells.	SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1		
A3-Offset Hysteresis CP length Config 1,2,3 CP length TimeToTrigger S Config 1,2,3 Filter coefficient DRX Config 1,2,3 Config 1 Synchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1. Config 2,3 Synchronous cells.			Config 2	SSB.1 FR1		As specified in clause A.3.10.1		
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.			Config 3	SSB.2 FR1		As specified in clause A.3.10.1		
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.	A3-Offset	dB	Config 1,2,3	-6				
TimeToTrigger s Config 1,2,3 0 Filter coefficient Config 1,2,3 0 DRX Config 1,2,3 OFF DRX is not used Time offset between serving and neighbour cells Config 2,3 3μs Synchronous cells. Config 2,3 3μs Synchronous cells.	Hysteresis	dB	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.	CP length		Config 1,2,3	Normal				
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.		S	Config 1,2,3					
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.	Filter coefficient					L3 filtering is not used		
serving and neighbour cells The timing of Cell 2 is 3ms later than the timing of Cell 1. Config 2,3 3µs Synchronous cells.				OFF				
cells than the timing of Cell 1. Config 2,3 3μs Synchronous cells.			Config 1	3ms				
Config 2,3 3μs Synchronous cells.								
	cells		0 " 0 "	3μs				
T1 s Config 1 2 3 5			Config 2,3			Synchronous cells.		
	T1	s	Config 1,2,3	5				
T2 s Config 1,2,3 TBD TBD					TBD			

Table A. 6.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Cell 1		Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Chan			Config 1,2,3		1		2	
Duplex mode			Config 1			-DD	<u> </u>	
TDD andimum	ati a la		Config 2,3			TDD		
TDD configur	ation		Config 1 Config 2			pplicable Conf.1.1		
			Config 3			Conf.2.1		
BW _{channel}		MHz	Config 1,2			I _{RB,c} = 52		
			Config 3		40: N	RB,c = 106		
BWP BW		MHz	Config 1,2		10: N	RB,c = 52		
DWD	Initial DI DIAID		Config 3			RB,c = 106		
BWP configuratio	Initial DL BWP Dedicated DL		Config 1, 2,			WP.0.1 WP.1.1		
n	BWP Dedicated UL		3		III R	WP.1.1		
	BWP				ULD	OVVE.1.1		
OCNG Patter A.3.2.1.1 (OF			Config 1,2,3	OI	P.1	c)P.1	
PDSCH Refe			Config 1	SR.1.	1 FDD]	-	
measuremen	t channel		Config 2	SR.1.	1 TDD]		
			Config 3		1 TDD			
CORESET R	eference		Config 1		1 FDD		-	
Channel			Config 2		1 TDD	-		
SMTC config	uration defined		Config 3	UR2.	1 TDD]		
in A.3.11.1 ar			Config 1		SN	MTC.2		
			Config 2, 3	SMTC.1				
PDSCH/PDC spacing	CH subcarrier	kHz	Config 1,2 Config 3	15 30				
EPRE ratio of	PSS to SSS							
EPRE ratio of to SSS	PBCH DMRS			0 0				
	PBCH to PBCH						0	
	PDCCH DMRS							
EPRE ratio of PDCCH DMR			Config 1,2,3					
EPRE ratio of	PDSCH DMRS		3 ,=,-					
EPRE ratio of PDSCH to								
	OCNG DMRS							
to SSS(Note 1) EPRE ratio of OCNG to								
OCNG DMRS (Note 1)								
		dBm/15 kHz				-98		
N oc Note2		dBm/S CS	Config 1,2 Config 3	-98 05				
SS-RSRP Note	3	dBm/S	Config 1,2	-94	-94	-95 -Infinity	-91	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		CS dB	Config 3 Config 1,2,3,4,5,6	<u>-91</u> 4	-91 4	-Infinity -Infinity	-88 7	
\hat{E}_{s}/N_{oc}		dB	Config 1,2,3	4	4	-Infinity	7	
Io ^{Note3}		dBm/9. 36MHz	Config 1,2	-67.11	-67.11	-Infinity	-65.38	
		dBm/38 .16MHz	Config 3	-62.27	-62.27	-Infinity	-61.06	
Propagation (Condition		Config 1,2,3		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 $_{N_{-\infty}}$ 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.

A.6.6.2.3.2 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 [TBD] 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 [TBD] 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.6.6.2.4 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.4.1 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 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.6.6.2.4.1-1, A.6.6.2.4.1-2 and A.6.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.4.1-2 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 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.6.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

Config	Description						
1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode						
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode						
3	NR 30kHz SSB SCS, 40MHz 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 has the same SCS, BW and duplex mode as NR serving cell							

Table A.6.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Value				Comment		
		configurati	Test	Test	Test Test				
		on	1	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 (Pcell)			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		2		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		
		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 DRX		DRX is 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	TBD	TBD	TBD	TBD			

Table A.6.6.2.4.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Ce	II 1	С	ell 2		
			configuratio n	T1	T2	T1	T2		
NR RF Channel Number			Config 1,2,3	1			2		
Duplex mode			Config 1			-DD			
			Config 2,3			ΓDD			
TDD configu	ration		Config 1			pplicable			
			Config 2			Conf.1.1			
DW		N 41 1—	Config 3			Conf.2.1			
BW _{channel}		MHz	Config 1,2 Config 3			RB,c = 52			
BWP BW		MHz	Config 1,2		40: N _{RB,c} = 106 10: N _{RB,c} = 52				
DWI DW		1011 12	Config 3	40: N _{RB,c} = 106					
BWP	Initial DL BWP		July 1			WP.0.1			
configurati on	Dedicated DL BWP		Config 1, 2,	DLBWP.1.1					
	Dedicated UL BWP		-		ULB	WP.1.1	P.1.1		
A.3.2.1.1 (O			Config 1,2,3	OF	P.1)P.1		
PDSCH Refe			Config 1	SR.1.1 FDD			-		
measuremen	nt channel		Config 2	SR.1.	1 TDD				
			Config 3		I TDD				
CORESET F	Reference	_	Config 1		1 FDD		-		
Channel			Config 2		1 TDD				
OMEO (e 1 e 1		Config 3	CR2.	I TDD				
in A.3.11.1 a	guration defined and A.3.11. 2		Config 1		SMTC.2				
			Config 2, 3	SMTC.1					
spacing	CCH subcarrier	kHz	Config 1,2 Config 3		15 30				
EPRE ratio of PSS to SSS									
EPRE ratio of PBCH DMRS to SSS									
	of PBCH to PBCH								
to SSS	of PDCCH DMRS								
EPRE ratio of PDCCH DMI	RS		Config 1,2,3	0 0		0			
to SSS	of PDSCH DMRS								
EPRE ratio o									
to SSS(Note	of OCNG DMRS								
EPRE ratio of OCNG DMR	of OCNG to								
Note2	<u> </u>	dBm/15 kHz		-98					
N Note2		dBm/S CS	Config 1,2 Config 3			-98 -95			
SS-RSRP Note 3 dBm.		dBm/S	Config 1,2	-94	-94	-Infinity	-91		
		CS	Config 3	-91	-91	-Infinity	-88		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		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	-67.11	-67.11	-Infinity	-65.38		
		dBm/38 .16MHz	Config 3	-62.27	-62.27	-Infinity	-61.06		
Propagation Condition			Config 1,2,3	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_{∞} 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.6.6.2.4.2 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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.6.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.6.6.2.8.1 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.6.6.2.8.1-1, A.6.6.2.8.1-2, and A.6.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #2 as defined in Table A.6.6.2.8.1-2 is provided for UE that support per-FR gap.

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.

Supported test configurations are shown in table A.6.6.2.8.1-1.

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.6.6.2.8.1-1 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, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz									
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex									
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	mode									
Note: The UE	, , , , , , , , , , , , , , , , , , ,										

Table A.6.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter Unit Test		Test		Va	lue		Comment		
		configurati	Test	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	NR cell 1 (Pcell)			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 on NR RF Channel 1	C-SSB parameters Config 1 TBD								
		Config 2	TBD						
		Config 3	TBD						
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	TBD						
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	40	640	40	640	DRX is 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	TBD		TBD				

Table A.6.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Се	ell 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2,3	1		2		
Duplex mode		Config 1	FI	FDD		TDD	
•		Config 2,3	TI	OD	TDD		
BW _{channel}	MHz	Config 1		B,c = 52	100: N _{RB,c} = 66		
		Config 2		$_{\rm B,c} = 52$	100: N _{RB,c} = 66		
5005 500		Config 3		B,c = 106	100: N _{RB,c} = 66		
BWP BW	MHz	Config 1		B,c = 52	100: N _{RB,c} = 66		
		Config 2		B,c = 52	100: N _{RB,c} = 66		
OCNG Patterns defined in		Config 3 Config 1,2,3	40: INRE	a,c = 106	100: N _{RB,c} = 66		
A.3.2.1.1 (OP.1)				P.1	OP.1		
PDSCH Reference		Config 1		1 FDD		-	
measurement channel		Config 2		1 TDD			
		Config 3		1 TDD			
CORESET Reference		Config 1		1 FDD	_	-	
Channel		Config 2		1 TDD	4		
SMTC configuration defined		Config 3	CR2.	1 TDD			
SMTC configuration defined in A.3.2.1.1 and A.3.2.1.2		Config 1,2	SMTC	.1 FR1	SMT	C.1 FR2	
		Config 3	SMTC	.2 FR1	SMT	C.1 FR2	
PDSCH/PDCCH subcarrier	kHz	Config 1,2		5		120	
spacing		Config 3	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)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)			- NIA				
UE orientation around TBD axis and TBD axis	degrees	Config 1,2,3		IA	TBD		
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1,2,3	٨	IA	NA	TBD	
N oc Note2	dBm/15 kHz	Config 1,2,3	-(98	-98		
	Note5						
N Note2	dBm/S	Config 1,2	-98		-89		
	CS	Config 3	-(-95		-89	
CC DCDD Note 3	Note4	Confin 4.0	04 04		[mfimite:	00	
SS-RSRP Note 3	dBm/S CS	Config 1,2 Config 3	-94 -94 -91 -91		-Infinity -Infinity	-82 -82	
	Note5	Corning 3	-9 I	-91	-irillility	-02	
$\hat{E}_{\!\scriptscriptstyle s}/I_{\!\scriptscriptstyle ot}$	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	-66.7 -66.7		-	-	

	dBm/38 .16MHz	Config 3	-61.99	-61.99	-	-
	dBm/95 .04	Config 1,2,3	-	-	-Infinity	-55.5
	MHz Note5					
Propagation Condition		Config 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_{∞} 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

Table A.6.6.2.8.1-4: DRX-Configuration for SA inter-frequency event triggered reporting with SSB time index detection

Field	Test1&3	Test2&4	Comment
Fleiu	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	ms1	ms1	38.331
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.6.6.2.8.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting with SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331
sr-ConfigIndex	TBD	

A.6.6.2.8.2 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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.6.6.3 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, 10MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40MHz 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 measurement quantity		RSRP	Measurement quantity for Cell 2
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-95	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.6.6.3.	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	TDD	Conf.1.1
J	SCS=30 KHz		3, 6		Conf.1.2
BWchannel	•	MHz	1, 4	10: N _{RB}	c = 52 (FDD)
			2, 5		c = 52 (TDD)
			3, 6		= 106 (TDD)
PDSCH reference me	easurement		1, 4		1.1 FDD
channel			2, 5	SR.	1.1 TDD
			3, 6	SR.	2.1 TDD
CORSET reference of	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
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	b2-Threshold1		1, 2, 4, 5	-89	
		dBm	3, 6	-86	
EPRE ratio of PSS to SSS			1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH_DMRS to SSS		1			
EPRE ratio of PBCH to PBCH_DMRS		1			
EPRE ratio of PDCC	H_DMRS to SSS	1			
EPRE ratio of PDCC	H to	1			
PDCCH_DMRS		dB			0
EPRE ratio of PDSC	H_DMRS to SSS				
EPRE ratio of PDSC	H to				
PDSCH_DMRS					
EPRE ratio of OCNG		_			
EPRE ratio of OCNG	to OCNG DMRS				
N _{oc} Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6		-104
N _{oc} Note2		dBm/SCS	1, 2, 4, 5		-104
			3, 6		-101
Ê _s /N _{oc}		dB	1, 2, 3, 4, 5, 6	17	7
Ê _s /I _{ot} Note3		dB	1, 2, 3, 4, 5, 6	17	7
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-87	-97
		dBm/SCS	3, 6	-84	-94
SSB_RP ^{Note3}	SSB_RP ^{Note3}		1, 2, 4, 5	-87	-97
			3, 6	-84	-94
I Note3		dBm/9.36 MHz	1, 2, 4, 5	-58.96	-68.26
IO ^{Note3}		dBm/38.16 MHz	3, 6	-52.87	-62.17
Propagation condition	 n		1, 2, 3, 4, 5, 6	F	TU70
Antenna Configuration			1, 2, 3, 4, 5, 6		k2 Low
Matrix			., _, 0, 1, 0, 0		
NI (4 OONIO I					*** 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_{α} 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.6.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2	
			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		4, 5, 6	6	
configuration ^{Note1}				
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5MHz: N _{RB} ,	c = 25
			10MHz: N _{RB}	
			20MHz: N _{RB,}	
PDSCH parameters:		1, 2, 3	5MHz: R.7	
DL Reference Measurement			10MHz: R.3	
Channel ^{Note2}			20MHz: R.6	
		4, 5, 6	5MHz: R.4	
			10MHz: R.0	
DOTION / DD OOL / DUILOU		4.0.0	20MHz: R.3	
PCFICH/PDCCH/PHICH		1, 2, 3	5MHz: R.11	
parameters: DL Reference Measurement			10MHz: R.6	
Channel ^{Note2}		4, 5, 6	20MHz: R.1 5MHz: R.11	
Charine		4, 5, 6	10MHz: R.6	
			20MHz: R.1	
OCNG Patterns ^{Note2}		1, 2, 3	5MHz: OP.2	
OONO I allems		1, 2, 0	10MHz: OP.	
			20MHz: OP.	-
		4, 5, 6	5MHz: OP.9	
		., ., .	10MHz: OP.	
			20MHz: 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				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RANote3				
OCNG_RBNote3	alD and /4 Clall In	4 0 0 4 5 0	104	
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6		
Ê _s /N _{oc} Ê _s /I _{ot} ^{Note5}	dB dB	1, 2, 3, 4, 5, 6	-Infinity	17 17
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-Infinity	
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6		
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB} ,
Drangation Cardities		4 2 2 4 5 2	FT! 17/	/50)
Propagation Condition				
Antenna Configuration and 1, 2, 3, 4, 5, 6 1x2 Low Correlation Matrix				N
		fi	enecified in table 4.2-1 in TS	00.044

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 sections 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 fulfilled.

Note 5: 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.

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.6.7 Measurement Performance requirements

A.6.7.1 SS-RSRP

A.6.7.1.1 intra-frequency case

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 Sections 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 the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Co	nfig	Description			
1		NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode			
3		NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode			
Note: Th	Note: The UE is only required to be tested in one of the supported test configurations				

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Daviere	Parameter		Tes	st 1_	Tes	st 2	Tes	st 3
	5161 	Unit	Cell 1 Cell 2 Cell 1 Cell 2			Cell 1 Cell 2		
SSB ARFCN	Config 1		freq1 freq1 FDD				fre	q1
Duplex mode	Config 1	+						
	Config 1		TDD Not Applicable					
TDD configuration	Config 2	-	TDDConf.1.1					
	Config 3				TDDC	onf.2.1		
	Config 1				10: N _{RE}	_{B,c} = 52		
BWchannel	Config 2	MHz			10: N _{RE}	s,c = 52		
	Config 3				40: N _{RB}			
	Config 1				10: N _{RE}	s,c = 52		
BWP BW	Config 2				10: N _{RE}	s,c = 52		
	Config 3				40: N _{RB}	$_{\rm i,c} = 106$		
Downlink initial BWP config	uration				DLB\	NP.0		
Downlink dedicated BWP c	onfiguration				DLB\	NP.1		
Uplink dedicated BWP conf	iguration				ULB\	WP.1		
DRX Cycle	1	ms			Not App	plicable		
	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	
RMSI CORESET Reference Channel	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
	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	
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	
SMTC configuration				SMT	ΓC.1			
OCNG Patterns				OCNG p	oattern 1			
PDSCH/PDCCH Config 1,2		kHz			15 I	kHz		
subcarrier spacing Config 3		NI IZ			30k	кHz		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS		4						
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS		<u> </u>	_	_	_	_	_	_
EPRE ratio of PDCCH to P		dB	0	0	0	0	0	0
EPRE ratio of PDSCH DMF EPRE ratio of PDSCH to PI		-						
EPRE ratio of OCNG DMRS	S to SSS(Note 1)							
EPRE ratio of OCNG to OC	EPRE ratio of OCNG to OCNG DMRS (Note 1)					<u> </u>		

N oc Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_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_H	dBm/15Kh	-10	06	-8	38	-11 -1 -11	16 5.5 15 4.5 14 13 2.5	
NOTE2	Config 3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	Z	-113		-94		-116 -115.5 -115 -114.5 -114 -113 -112.5		
	Config 1,2			-10	06	-8	38		e as	
N oc Note2	Config 3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-11	10		-91		-113 -112.5 -112 -111.5 -111 -110 -109.5	
\hat{E}_{s}/I_{ot}			dB	2.5	-6	2.5	-6	0.46	-5.76	
\hat{E}_s/N_{oc}			dB	6	1	6	1	3	-1	
SS- RSRP ^{Not}	Config 1,2	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-100	-105	-82	-87	-113 -112.5 -112 -111.5 -111 -110 -109.5	-117 -116.5 -116 -115.5 -115 -114 -113.5	
e3	Config 3	NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_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_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	ubili/303	-106	-109	-85	-90	-110 -109.5 109 -108.55 -108 -107 -106.5	-114 -113.5 -113 -112.5 -112 -111 -110.5	
Io ^{Note3}	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-70.09 -52.09		-82 -81 -81	.26 .76 .26			

		NR_FDD_FR1_E, NR_TDD_FR1_E				-80.26
		NR_FDD_FR1_G				
		NK_FDD_FK1_G				-79.26
		NR_FDD_FR1_H				-78.76
		NR_FDD_FR1_A,				
		NR_TDD_FR1_A				-76.16
	0	NR_FDD_FR1_B	dBm/	-70.99	-51.99	-75.66
		NR_TDD_FR1_C				-75.16
		NR_FDD_FR1_D,				
	Config 3	NR_TDD_FR1_D	38.16MHz			-74.66
		NR_FDD_FR1_E,				
		NR_TDD_FR1_E				-74.16
		NR_FDD_FR1_G				-73.16
		NR_FDD_FR1_H				-72.66
Propagatio	Propagation condition		-		AWGN	
Antenna configuration 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-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.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in section 10.1.2.1.1 and relative requirement in section 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 Sections 10.1.4.1.1 and 10.1.4.1.2 for intra 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, 10MHz bandwidth, FDD duplex mode		
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode		

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 intra 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

I	Parameter	Unit	Te	st 1	Te	est 2
	Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2

0: N _{RB,c} = 52 0: N _{RB,c} = 106 0 1 FDD 1 TDD - FDD CR.1.1 FDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1 0
0 FDD - FDD FDD
CR.1.1 FDD CR.1.1 TDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1
CR.1.1 FDD CR.1.1 TDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1
CR.1.1 FDD CR.1.1 TDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1
CR.1.1 FDD CR.1.1 TDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1 0
CR.1.1 TDD CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1
CR.2.1 FDD 1 OP.1 MTC.1 FR1 MTC.2 FR1
1 OP.1 MTC.1 FR1 MTC.2 FR1
MTC.1 FR1 MTC.2 FR1
MTC.2 FR1
0
TBD
TBD
ТВО
TBD
TBD
TBD
100
<u> </u>
TBD
TBD
q2 TBD
В
TBD
TBD
TBD
TBD
TBD
TBD
q2 TBD
B
TBD
TBD
TBD
TBD
TBD
TRD
TBD eq2 TBD
TBD
TBD eq2 TBD B

\hat{E}_{s}/I_{ot}			dB	10	10	13	-4
		NR_FDD_FR1_A NR_TDD_FR1_A					TBD
		NR_FDD_FR1_B					TBD
		NR_TDD_FR1_C				RSRP	TBD
	Config 1,	NR_FDD_FR1_D		0.	4.65	for Cell	TRD
	2, 4, 5	NR_TDD_FR1_D		-02	+.05	2 +	100
		NR_FDD_FR1_E				25dB	TBD
		NR_TDD_FR1_E	-				
SS-		NR_FDD_FR1_G NR_FDD_FR1_H	-				
RSRPN		NR FDD FR1 A	dBm/SCS				עפו
ote3		NR_TDD_FR1_A					TBD TBD TBD
		NR FDD FR1 B	-				TBD
		NR TDD FR1 C				RSRP	
	Carefier 2 C	NR_FDD_FR1_D	1	0.	1.05	for Cell	
	Config 3, 6	NR_TDD_FR1_D		-8	1.65	2+	IBD
		NR_FDD_FR1_E				25dB	TRD
		NR_TDD_FR1_E					
		NR_FDD_FR1_G					TBD TBD TBD TBD TBD TBD TBD TBD
		NR_FDD_FR1_H					TBD
		NR_FDD_FR1_A				Т	BD
		NR_TDD_FR1_A NR_FDD_FR1_B	-				.DD
		NR_FDD_FR1_B NR_TDD_FR1_C	-	-56.28			
	Config 1,	NR_FDD_FR1_D	dBm/ 9.36MHz				
	2, 4, 5	NR_TDD_FR1_D				TBD	
	_, ., .	NR FDD FR1 E					
		NR_TDD_FR1_E				Į	BD
		NR_FDD_FR1_G				Т	BD
Io ^{Note3}		NR_FDD_FR1_H				Т	BD
10		NR_FDD_FR1_A				_	RD
		NR_TDD_FR1_A	-				
		NR_FDD_FR1_B					
		NR_TDD_FR1_C				T	BD
	Config 3, 6	NR_FDD_FR1_D	dBm/	-50	0.19	Т	BD
	3 ,	NR_TDD_FR1_D	38.16MHz				
		NR_FDD_FR1_E NR_TDD_FR1_E				Т	BD
		NR_FDD_FR1_G	1			т	BD
		NR FDD FR1 H	1				
△ / • •	I	<u> DD_ </u>				•	
\hat{E}_s/N_o			dB	10	10	13	-4
Propagat	ion condition		-	AV	/GN	AV	VGN

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.

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 section 10.1.4.1.1 and Relative requirement in section 10.1.4.1.2.

A.6.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.6.7.1.3.1 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 Sections 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.6.7.1.3.1-1.

Table A.6.7.1.3.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz	120 kHz SSB SCS, 100MHz
	bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz	
	bandwidth, TDD duplex mode	

A.6.7.1.3.2 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 for the Cell 1 and Cell 2 are given in Table A.6.7.1.3.2-1 and Table A.6.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP intra frequency measurements are tested by using the parameters in Table A.6.7.1.3.2-1 and Table A.6.7.1.3.2-2. The inter frequency measurements are supported by a measurement gap.

Table A.6.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Linit	Tes	st 1	Tes	st 2
Parameter	Coming	Unit	Cell 1	Cell 2	Cell 1	Cell 2

BWchannel 1	SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
BW/channel 2		1		10:				
BW/channel 2				$N_{RB,c} = 52$	100:	$N_{RB,c} = 52$	100.	
Duplex mode	BWchannel	2	MHz					
Duplex mode				40:	TAKB,C — CC	40:	1 4KB,C — 00	
Duplex mode		3						
TDD								
TDD configuration	Duplex mode				TDD		TDD	
TDDConf.								
TDD configuration		1						
PDSCH Reference measurement channel	TDD configuration	2		1.1		1.1		
PUSCH Reference measurement channel		3			3.1		3.1	
Measurement channel 3	DDCCLLD (1		SR.1.1 FDD		SR.1.1 FDD		
SR.2.1 FDD		2		SR.1.1 TDD	-	SR.1.1 TDD	-	
CR.1.1 TDD	measurement channel		1		1			
Reference Channel 3	DMOLOODEOET	1		CR.1.1 FDD	-	CR.1.1 FDD	-	
Dedicated CORESET 1		2		CR.1.1 TDD	-	CR.1.1 TDD	-	
Dedicated CORESE Reference Channel 2	Neierence Chainnei	3		CR.2.1 FDD	-	CR.2.1 FDD	-	
Reference Channel 2	Dadicated CORESET			CCR.1.1 FDD	-	CCR.1.1 FDD	1	
SSB configuration				CCR.1.1 TDD	-	CCR.1.1 TDD	1	
SSB configuration	Reference Charmer	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-	
SSB configuration 2		1		SSB.1				
SSB configuration								
SSB.2 FR1	SSB configuration	2						
S	garanen				FR2		FR2	
OCNG Patterns 1~3 OP.1 OP.1 DL BWP 1~3 DLBWP.1 DLBWP.1 UL BWP 1~3 ULBWP.1 ULBWP.1 SMTC configuration 1~3 SMTC.1 SMTC.1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS SSS EPRE ratio of PBCH to PBCH DMRS FPRE ratio of PDCCH DMRS Image: PRE ratio of PDCCH DMRS of PDCCH DMRS of PDSCH DMRS of PDSCH DMRS Image: PRE ratio of PDSCH DMRS of PDSCH DMRS of PDSCH DMRS of PDSCH DMRS Image: PRE ratio of PDSCH DMRS of		3						
DL BWP	OCNC Dattaria	4.0			1		2.4	
ULBWP								
SMTC configuration 1~3 SMTC.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 EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCH 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 AWGN 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 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 OCNG DMRS Note 1 Propagation condition 1~3 - AWGN AWGN				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 PDCH 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 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 Propagation condition 1~3 - AWGN AWGN	SMTC configuration	1~3		SM	ГС.1	SMT	C.1	
DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCH to PDCH DMRS PDCH DMRS 1~3 BPRE 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 Propagation condition 1~3 - AWGN	EPRE ratio of PSS 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 DMRS to SSS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation condition 1~3 - AWGN AWGN								
## PBCH DMRS EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to 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 EPRE ratio of OCNG EPRE ratio of OCNG to AWGN AWGN								
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 EPRE ratio of OCNG DMRS Note 1 AWGN AWGN								
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 EPRE ratio of OCNG DMRS Note 1 AWGN AWGN								
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 - AWGN AWGN		1						
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 - AWGN AWGN		1~3	dB	0	0	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 Propagation condition 1~3 - AWGN AWGN								
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 AWGN		1						
EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation condition 1~3 - AWGN AWGN								
EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation condition 1~3 - AWGN AWGN	EPRE ratio of OCNG	1						
OCNG DMRS Note 1 Propagation condition 1~3 - AWGN 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 $\frac{N_{oc}}{}$ to be fulfilled.

Table A.6.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

	Parameter	Config	Unit	Test 1		Te	st 2	
	raiailletei	Coning	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
N _{oc}	NR_FDD_FR1_A, NR_TDD_FR1_A		dBm/15	TBD			TBD	
Note2	NR_FDD_FR1_B	1~3	kHz			TBD	TBD	
	NR_TDD_FR1_C						TBD	

	NR_FDD_FR1_D, NR_TDD_FR1_D						TBD	
	NR_FDD_FR1_E,						TBD	
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD	
	NR_FDD_FR1_H						TBD	
	NR_FDD_FR1_A,						TBD	
	NR_TDD_FR1_A NR_FDD_FR1_B						TBD	
	NR_TDD_FR1_C						TBD	
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		TBD		TBD	TBD	
	NR_FDD_FR1_E,						TBD	
	NR_TDD_FR1_E NR_FDD_FR1_G						TBD	
N_{oc}	NR_FDD_FR1_H		dBm/SS				TBD	
Note2	NR_FDD_FR1_A,		B SCS		TBD		TBD	
	NR_TDD_FR1_A NR_FDD_FR1_B						TBD	
	NR_TDD_FR1_C						TBD	
	NR_FDD_FR1_D, NR_TDD_FR1_D	3		TBD		TBD	TBD	
	NR_FDD_FR1_E,						TBD	
	NR_TDD_FR1_E							
	NR_FDD_FR1_G NR FDD FR1 H						TBD TBD	
	\hat{E}_s/I_{ot}	1~3	dB	TBD	TBD	TBD	TBD	
	NR_FDD_FR1_A,	17-0	ub ub	100	100	100		
	NR_TDD_FR1_A						TBD	
	NR_FDD_FR1_B NR_TDD_FR1_C						TBD TBD	
	NR_FDD_FR1_D,	1,2,4,5		TBD		TBD	TBD	
	NR_TDD_FR1_D NR_FDD_FR1_E,	1,2,4,5		100		100		
	NR_TDD_FR1_E						TBD	
SS-	NR_FDD_FR1_G NR_FDD_FR1_H		4D /CC				TBD	
RSR	NR_FDD_FR1_A,		dBm/SC S		TBD		TBD	
P ^{Note3}	NR_TDD_FR1_A						TBD	
	NR_FDD_FR1_B NR_TDD_FR1_C	3		TBD		TBD	TBD TBD	
	NR_FDD_FR1_D,						TBD	
	NR_TDD_FR1_D NR_FDD_FR1_E,							
	NR_TDD_FR1_E						TBD	
	NR_FDD_FR1_G NR_FDD_FR1_H						TBD	
	NR_FDD_FR1_H NR_FDD_FR1_A,						TBD	
	NR_TDD_FR1_A						BD	
	NR_FDD_FR1_B NR_TDD_FR1_C	-	,				BD BD	
	NR_FDD_FR1_D,	1,2,4,5	dBm/ 9.36MH	N/A			BD	
	NR_TDD_FR1_D NR_FDD_FR1_E,	1,2,4,0	2.30WIT	1 1// 1				
	NR_TDD_FR1_E						3D	
	NR_FDD_FR1_G NR_FDD_FR1_H						3D	
	NR_FDD_FR1_H NR_FDD_FR1_A,						BD	
	NR_TDD_FR1_A						BD	
Io ^{Note3}	NR_FDD_FR1_B NR_TDD_FR1_C		,				BD BD	
	NR_FDD_FR1_D,	3	dBm/ 38.16M	N/A			3D 3D	
	NR_TDD_FR1_D NR_FDD_FR1_E,		Hz	14//1			3D 3D	
	NR_TDD_FR1_E							
	NR_FDD_FR1_G NR_FDD_FR1_H	-					BD BD	
	NR_TDD_FR2_A						BD	
	NR_TDD_FR2_B		dBm/				BD	
	NR_TDD_FR2_F NR_TDD_FR2_G	1~3	95.04M Hz	N/A	TBD	TBD		
	NR_TDD_FR2_T		112			TBD TBD		
L		Ī	l .		1			

1	NR_TDD_FR2_Y					TBD			
Ê	C_s/N_{oc}	1~3	dB	TBD	TBD	TBD	TBD		
Note 1:	The state of the s								
	They are not settable parameters themselves.								
Note 2:	Note 2: RSRP minimum requirements are specified assuming independent interference and noise								
	at each receive	r antenna	port.						

A.6.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in section 10.1.5.1.1.

A.6.7.2 SS-RSRQ

A.6.7.2.1 Intra-frequency case

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 test 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, 10MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3		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

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parame	eter	Unit	Tes		Tes			st 3
		0	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Config 1		fre	q1	fre		tre	:q1
Duplex mode	Config 1 Config 2,3	-			FD TD			
	Config 1				Not App			
TDD configuration	Config 2	1	TDDConf.1.1					
122 comgaration	Config 3	-			TDDCo			
	Config 1				10: N _{RB}			
BWchannel	Config 2	MHz			10: N _{RB}	·		
DVV channel	Config 3	- 1011 12			40: N _{RB}			
	-							
	Config 1	-			10: N _{RB}			
BWP BW	Config 2	_			10: N _{RB}			
	Config 3				40: N _{RB} ,			
DRx Cycle	1	ms	Not Applicable			Γ		
	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	
	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	I			1	OP.	. 1	ı	ı
SS-RSSI-Measurement					Not App	licable		
SMTC configuration					SMT			
	Config 1,2				SSB.1			
SSB configuration	Config 3	1			SSB.2			
PDSCH/PDCCH	Config 1,2				15 k			
subcarrier spacing	Config 3	kHz			30kl			
EPRE ratio of PSS to SSS					0010	 		
EPRE ratio of PBCH DMRS]						
EPRE ratio of PBCH to PBCEPRE ratio of PDCCH DMF		-						
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH DMF	RS to SSS			-				
EPRE ratio of PDSCH to P		4						
EPRE ratio of OCNG DMRS		-						
LI AL IANO OI OCING 10 OC	ANO DIVINO (INOLE I)	1	1		I	<u> </u>	I	I

N Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H	dBm/15kH z	-g -g		[-110 [-110		[-11 [-1 [-11	
N oc Note2	Config 3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G	dBm/SCS	-8	88	[-107	7.05]	[-11 [-1 [-11 [-1	5.5] 15]
\hat{E}_{s}/I_{ot}			dB	-1.	76	-4	.7	-546	-5.46
\hat{E}_{s}/N_{oc}			dB	3	3	-2.9	-2.9	-4	-4
SS- RSRP ^{Not} e3	Config 1,2 Config 3	NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E	dBm/SCS	-88	-88	[- 112.95] [- 109.95]	[- 112.95] [- 109.95]	[-124] [- 123.5] [-123] [- 122.5] [-122] [-121] [- 120.5] [-121] [- 119.5] [-119] [-118] [- 117.5]	[-124] [- 123.5] [-123] [- 122.5] [-122] [-121] [- 120.5] [-121] [- 119.5] [-119] [-118] [- 117.5]
SS-RSRQ Note3 SS-RSRQ Note3 NR_TDD_FR1 NR_TDD_FR1 NR_TDD_FR1 NR_TDD_FR1 NR_TDD_FR1 NR_TDD_FR1 NR_TDD_FR1 NR_FDD_FR1		NR_FDD_FR1_A, NR_TDD_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_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-16.76	-16.76	[- 17.34	[- 17.34]
Io ^{Note3}	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C	dBm/ 9.36MHz	-5	66	[-7	'9]		9.5] 39] 3.5]

		NR_FDD_FR1_D, NR_TDD_FR1_D						3-]	38]
		NR_FDD_FR1_E, NR_TDD_FR1_E						[-8	7.5]
		NR_FDD_FR1_G						[-86	6.5]
		NR_FDD_FR1_H						3-]	36]
		NR_FDD_FR1_A, NR_TDD_FR1_A						[-83	.41]
		NR_FDD_FR1_B						-	.91]
	Config 3	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 38.16MHz	-50	.00	[-7	'3]		.41] .91]
		NR_FDD_FR1_E, NR_TDD_FR1_E						[-81	.41]
		NR_FDD_FR1_G NR_FDD_FR1_H							.41] .91]
Propagation	condition		-	AWGN	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna cor	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 Section 3.5.2.

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 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 alnd 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, 10MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode					
3		NR 30kHz SSB SCS, 40MHz 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

ſ	Parameter	Unit	Test 1		Test 2		Test 3	
	Parameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFO	N .			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mo		Config 1				FD	D		•
Вирюх по		Config 2,3				TD			
		Config 1		Not Applicable					
TDD config	guration	Config 2				TDDCc			
		Config 3				TDDCc	onf.2.1		
		Config 1				10: N _{RB}	$_{3,c} = 52$		
BW _{channel}		Config 2	MHz			10: N _{RB}	s,c = 52		
		Config 3				40: N _{RB} ,	c = 106		
		Config 1				10: N _{RB}	s,c = 52		
BWP BW		Config 2				10: N _{RB}	s,c = 52		
		Config 3				40: NRB	.c = 106		
DRX Cycle	<u> </u>	<u> </u>	ms			Not App			
2.0.0	•			SR.1.1		SR.1.1		SR.1.1	
		Config 1,4		FDD		FDD		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 Reference	CORESET 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 Pat	terns	I			l .	OCNG p	attern 1		
OMTO	£: 4:	Config 1,2				SMTC p			
SMTC con	figuration	Config 3		SMTC pattern 2					
SSB confi	guration	Config 1,2				SSB patter			
		Config 3				SSB patter		1	
PDSCH/PI		Config 1,2	kHz			15 k			
subcarrier	· ·	Config 3			1	30 k	(Hz	1	
	of PSS to SSS of PBCH DMRS	to SSS	-						
EPRE ratio	of PBCH to PBC	H DMRS							
	of PDCCH DMR of PDCCH to PD		dB	0	0	0	0	0	0
	of PDSCH DMR		J 05						U
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)									
		NG DMRS (Note 1)							
		NR_FDD_FR1_A			•		•	ТВ	D
		NR_TDD_FR1_A	-						
		NR_FDD_FR1_B NR_TDD_FR1_C	1					TB TB	
N_{oc}	0	NR_FDD_FR1_D	-ID /451 ! !		. 40		ND.	TB	
Note2	Config 1,2	NR_TDD_FR1_D	dBm/15kHz	-80).18	TE	SU		
		NR_FDD_FR1_E						ТВ	D
		NR_TDD_FR1_E NR_FDD_FR1_G	1					ТВ	.D
		NR_FDD_FR1_H	1						D

_	•		7					1	
		NR_FDD_FR1_A						ТВ	BD
		NR_TDD_FR1_A NR_FDD_FR1_B						TB	ח
		NR_TDD_FR1_C						TBD	
N oc	0 " 0	NR_FDD_FR1_D	15 (45)	-86.27		TBD		TBD	
Note2	Config 3	NR_TDD_FR1_D	dBm/15kHz			IE	טפ		
		NR_FDD_FR1_E						TBD	
		NR_TDD_FR1_E						TD	
		NR_FDD_FR1_G NR_FDD_FR1_H						TB TB	
		NR_FDD_FR1_A							
		NR_TDD_FR1_A						TB	
		NR_FDD_FR1_B						TB	
		NR_TDD_FR1_C						TB	
	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D		-80).18	TE	BD	TB	טט
		NR_FDD_FR1_E						TB	BD
		NR_TDD_FR1_E							
.,		NR_FDD_FR1_G						TB	
N oc Note2		NR_FDD_FR1_H	dBm/15kHz					TB	SD
110102		NR_FDD_FR1_A NR_TDD_FR1_A						TB	BD
		NR_FDD_FR1_B						TB	BD
		NR_TDD_FR1_C						TB	BD
	Config 3	NR_FDD_FR1_D		-83	3.27	TBD		TB	BD
		NR_TDD_FR1_D NR_FDD_FR1_E						TB	יח
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						TB	BD
		NR_FDD_FR1_H						TB	D
$\hat{\mathbf{E}}_{\!\scriptscriptstyle{\mathrm{s}}}/\mathbf{I}_{\!\scriptscriptstyle{\mathrm{ot}}}$			dB	-1	.75	TE	BD	TBD	TBD
\hat{E}_{s}/N_{oc}			dB	-1	.75	TE	BD	TBD	TBD
37 00		NR_FDD_FR1_A						TDD	TDD
		NR_TDD_FR1_A						TBD	TBD
		NR_FDD_FR1_B						TBD	TBD
		NR_TDD_FR1_C NR_FDD_FR1_D						TBD TBD	TBD TBD
	Config 1,2	NR_TDD_FR1_D		-81.93	-81.93	TBD	TBD	, 55	155
		NR_FDD_FR1_E						TBD	TBD
		NR_TDD_FR1_E						TDD	TDD
SS-		NR_FDD_FR1_G NR_FDD_FR1_H						TBD TBD	TBD TBD
RSRP ^{Not}		NR_FDD_FR1_A	dBm/SCS						
65		NR_TDD_FR1_A						TBD	TBD
		NR_FDD_FR1_B						TBD	TBD
		NR_TDD_FR1_C						TBD	TBD
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	TBD	TBD	TBD	TBD
		NR_FDD_FR1_E						TBD	TBD
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						TBD	TBD
		NR_FDD_FR1_H NR_FDD_FR1_A						TBD	TBD
		NR_TDD_FR1_A						TBD	TBD
i		ND EDD ED4 D						TBD	TBD
		NR_FDD_FR1_B						דר	
		NR_TDD_FR1_C						TBD	TBD
SS-RSRQ	Note3	NR_TDD_FR1_C NR_FDD_FR1_D	dB	-14.77	-14.77	TBD	TBD	TBD TBD	
SS-RSRQ	Note3	NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E	dB	-14.77	-14.77	TBD	TBD		TBD
SS-RSRQ	Note3	NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D	dB	-14.77	-14.77	TBD	TBD	TBD	TBD TBD

Propagation	on condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
		NR_FDD_FR1_H			ı		ı	TBD	TBD
	NR_FDD_FR1_G						TBD	TBD	
		NR_TDD_FR1_E							
		NR_FDD_FR1_E						TBD	TBD
	Config 3	NR_TDD_FR1_D			50	TBD			
		NR FDD FR1 D						TBD	TBD
		NR_TDD_FR1_C						TBD	TBD
		NR FDD FR1 B						TBD	TBD
		NR_FDD_FR1_A NR_TDD_FR1_A							TBD
Io ^{Note3}		NR_FDD_FR1_H	dBm/SCS					TBD	TBD
		NR_FDD_FR1_G						TBD	TBD
		NR_TDD_FR1_E							
		NR_FDD_FR1_E					TBD	TBD	
	Config 1,2	NR_TDD_FR1_D		-:	50	10	טפ		
	Config 1.2	NR_FDD_FR1_D			50	TE	ח	TBD	TBD
		NR_TDD_FR1_C						TBD	TBD
		NR FDD FR1 B						TBD	TBD
		NR TDD FR1 A						TBD	TBD
		NR_FDD_FR1_A						TRD	TRD

- 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 Section 3.5.2.

A.6.7.2.2.3 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.6.7.3 SS-SINR

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 Sections 9.5.2 and section 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, 10MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

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
SSB GSC	CN	1~3		freq1	freq1
		1		FDD	FDD
Duplex m	node	2		TDD	TDD
		3		TDD	TDD
		1		N/A	N/A
TDD Con	figuration	2		TDDConf.1.1	TDDConf.1.1
		3		TDDConf.2.1	TDDConf.2.1
		1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}		2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
		3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
DDSCH E	Reference	1		SR.1.1 FDD	SR.1.1 FDD
	ment channel	2		SR.1.1 TDD	SR.1.1 TDD
modeard	mont onamor	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CC	RESET Reference	1		CR.1.1 FDD	CR.1.1 FDD
Channel	TREGET ROTOTOTIO	2		CR.1.1 TDD	CR.1.1 TDD
		3		CR.2.1 TDD	CR.2.1 TDD
Dedicated	d CORESET	1		CCR.1.1 FDD	CCR.1.1 FDD
	e Channel	2		CCR.1.1 TDD	CCR.1.1 TDD
		3		CCR.2.1 TDD	CCR.2.1 TDD
		1	<u> </u>	SSB.3 FR1	SSB.3 FR1
SSB conf	figuration	2		SSB.3 FR1	SSB.3 FR1
00110.5		3		SSB.4 FR1	SSB.4 FR1
OCNG P	atterns	1~3		OP.1	OP.1
DL BWP		1~3		DLBWP.1.1	DLBWP.1.1
UL BWP	f:	1~3		ULBWP.1.1	ULBWP.1.1
	onfiguration of reported RS	1~3 1~3		SMTC.1	SMTC.1
	reporting period	1~3		TBD	TBD
	of PSS to SSS	1~3		100	100
EPRE ratio	of PBCH DMRS to SSS				
	of PBCH to PBCH DMRS				
	of PDCCH DMRS to SSS				
DMRS	of PDCCH to PDCCH				
	of PDSCH DMRS to SSS	1~3	dB	0	0
EPRE ratio	of PDSCH to PDSCH				
DMRS	of OCNG DMRS to				
SSSNote 1	O O OCING DIVIRS 10				
Nete (of OCNG to OCNG				
DMRS Note	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				TBD
N					TBD
		1~3	dBm/15kHz	TBD	TBD
			22, 1010.12		. 55
					TBD
					IRD
	. – – – ,				TBD
					TRD
N_{aa}					
Note2		1,2	SCS	TBD	
					IBD
	NR_FDD_FR1_E,				TDD
	NR_TDD_FR1_E				טמו
N_{oc} Note2 N_{oc} Note2	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_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D	1~3	dBm/15kHz dBm/SSB SCS	TBD	TBD TBD TBD TBD TBD

	ND EDD ED1 C				TBD
	NR_FDD_FR1_G NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,		{		עסו
	NR_TDD_FR1_A,				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,				100
	NR_TDD_FR1_D	3		TBD	TBD
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
↑ /τ	141100_1111_11				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~3	dB	TBD	TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C	1,2			TBD
	NR_FDD_FR1_D,			TBD	TBD
	NR_TDD_FR1_D				
	NR_FDD_FR1_E, NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G				TBD
SSB	NR_FDD_FR1_H		dBm/SSB		TBD
RSRP	NR_FDD_FR1_A,		SCS		
Note3	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	3		TDD	
	NR_TDD_FR1_D			TBD	TBD
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				עסו
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C		dBm/9.36		TBD
	NR_FDD_FR1_D,	1,2	MHz	TBD	TBD
	NR_TDD_FR1_D	,			
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
lo Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	_	dBm/38.16	TDD	
	NR_TDD_FR1_D	3	MHz	TBD	TBD
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				טטו
	NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD

\hat{E}_s/N_o	c	1~3	dB	TBD	TBD		
Propagat	ion condition	1~3		AWGN	AWGN		
Note 1:							
Note 2:							
Note 3:							
Note 4: RSRP minimum requirements are specified assuming independent interference and r at each receiver antenna port.							

A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 1 shall fulfil the requirements in sections 10.1.19.1.

Editor's Note: which reports are used to verify the accuracy is FFS

A.6.7.4.2 CSI-RS based L1-RSRP measurement

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 Sections 9.5.3 and section 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, 10MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

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 L1-RSRP measurement based on the CSI-RS resources 0 and 1. 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. Repetition is configured as TBD for the CSI-RS resource set.

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		TDD	TDD
	3		TDD	TDD
	1		N/A	N/A
TDD Configuration	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
	1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	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	<u> </u>	SR.1.1 FDD	SR.1.1 FDD
measurement channel	2	<u> </u>	SR.1.1 TDD	SR.1.1 TDD
	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
	3		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2	-	CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
000 5	1		SSB.1 FR1	SSB.1 FR1
SSB configuration	2		SSB.1 FR1	SSB.1 FR1
00110 D #	3		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~3		OP.1	OP.1
DL BWP	1~3		DLBWP.1.1	DLBWP.1.1
UL BWP	1~3		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
001 00 0	1	-	CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS 0	2	-	CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
CSI-RS 1	2	-	CSI-RS 1.3 FDD	CSI-RS 1.3 FDD
CSI-RS I	3	-	CSI-RS 1.3 TDD CSI-RS 2.3 TDD	CSI-RS 1.3 TDD CSI-RS 2.3 FDD
Number of reported RS	1~3		2	2
EPRE ratio of PSS to SSS	1~3			
EPRE ratio of PBCH DMRS to SSS	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	1~3	dB	0	0
EPRE ratio of PDSCH to PDSCH	i			
DMRS	_			
EPRE ratio of OCNG DMRS to SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1	1			
NR_FDD_FR1_A,				TBD
NR_TDD_FR1_A	_]			טטו
NR_FDD_FR1_B	_]			TBD
NR_TDD_FR1_C	_			TBD
Note2	1~3	dBm/15kHz	TBD	TBD
NR_IDD_FR1_D		GDIII, IORI IZ	1.50	.50
NR_FDD_FR1_E,	1			TBD
NR_TDD_FR1_E	4			
NR_FDD_FR1_G	4			TBD
NR_FDD_FR1_H	1			TBD
NR_FDD_FR1_A,				TBD
NR_TDD_FR1_A	4	dBm/CSI-RS		
NR_FDD_FR1_B	1,2	SCS	TBD	TBD
Note2 NR_TDD_FR1_C	-{			TBD
NR_FDD_FR1_D, NR_TDD_FR1_D				TBD

	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E NR_FDD_FR1_G				TBD
	NR_FDD_FR1_H				TBD
	NR FDD FR1 A,				IDD
	NR_TDD_FR1_A				TBD
	NR FDD FR1 B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	0		TDD	TDD
	NR_TDD_FR1_D	3		TBD	TBD
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				TBD
• /	NR_FDD_FR1_H				TBD
$\hat{\mathrm{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$		1~3	dB	TBD	TBD
	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A NR_FDD_FR1_B				TBD
	NR TDD FR1 C				TBD
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D	1,2	dBm/CSI-RS SCS	TBD	TBD
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				TBD
COLDC	NR_FDD_FR1_G				TBD
CSI-RS RSRP	NR_FDD_FR1_H				TBD
Note3	NR_FDD_FR1_A,				TBD
	NR_TDD_FR1_A	3			
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D, NR_TDD_FR1_D			TBD	TBD
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				TBD
	NR FDD FR1 G				TBD
	NR_FDD_FR1_H				TBD
	NR_FDD_FR1_A,				TDD
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C		dBm/9.36		TBD
	NR_FDD_FR1_D,	1,2	MHz	TBD	TBD
	NR_IDD_FR1_D	,			
	NR_FDD_FR1_E, NR_TDD_FR1_E				TBD
	NR FDD FR1 G				TBD
	NR_FDD_FR1_H				TBD
lo Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				TBD
	NR_FDD_FR1_B				TBD
	NR_TDD_FR1_C				TBD
	NR_FDD_FR1_D,	3	dBm/38.16	TBD	TBD
	NR_TDD_FR1_D		MHz		100
	NR_FDD_FR1_E,				TBD
	NR_TDD_FR1_E				TBD
	NR_FDD_FR1_G NR_FDD_FR1_H				TBD
	LIVIN_I DD_FRI_II			I	טטו

\hat{E}_s/N_{oc}		1~3	dB	TBD	TBD	
Propagat	ion condition	1~3		AWGN	AWGN	
Note 1:	OCNG shall be used s transmitted power spe				nt total	
Note 2:	Interference from other constant over subcarrifor N_{oc} to be fulfilled	ers and time		t specified in the test is odelled as AWGN of a		
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 required at each receiver anter		specified assum	ning independent interf	erence and noise	

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 sections 10.1.19.2.

Editor's Note: which reports are used to verify the accuracy is FFS

A.7 NR standalone tests in FR2

A.7.1 SA: RRC IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 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.7.1.1.2-1: Supported test configurations

Co	onfiguration	Description
1		120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100MHz 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.
SSB config	guration		1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC con	SMTC configuration		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	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	[TBD]	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	[TBD]	T2 needs to be defined so that cell re- selection reaction time is taken into account.
Т3		S	1, 2	[TBD]	T3 needs to be defined so that cell re- selection reaction time is taken into account.

T3

T1

Cell 2

T2

T3

Cell 1

T2

Parameter

Unit

712

Table A.7.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

T1

Test configuration

TDD configuration		1, 2	TDDConf.3.1 TDDConf.3.1					1	
PDSCH RMC		1	5	SR.3.1 TDD			N/A		
configuration		2	SR.3.1 TDD			1			
RMSI CORESET		1		CR.3.1 TDD)	C	CR.3.1 TDD		
RMC configuration		2		CR.3.1 TDD			R.3.1 TDE		
Dedicated CORESET		1		CR.3.1 TDI			CR.3.1 TD		
RMC configuration		2		CR.3.1 TDI			CR.3.1 TD		
OCNG Pattern		1, 2		defined in A			lefined in A		
Initial DL BWP		1, 2		DLBWP.0			DLBWP.0		
configuration		-, _							
Initial UL BWP		1, 2		ULBWP.0			ULBWP.0		
configuration		., _		0			0		
RLM-RS		1, 2		SSB			SSB		
Qrxlevmin	dBm/SCS	1		TBD			TBD		
		2		TBD			TBD		
Pcompensation	dB	1, 2		0			0		
Qhysts	dB	1, 2		0			0		
Qoffset _{s, n}	dB	1, 2		0		0			
Cell_selection_and_	<u> </u>	1, 2				, , ,			
reselection_quality_		., _		SS-RSRP		SS-RSRP			
measurement			oo non						
AoA setup		1, 2	TBD			TBD			
\hat{E}_{s}/I_{ot}	dB	1	TBD	TBD	TBD	-infinity	TBD	TBD	
s / Ot		2							
N_{oc} Note2	dBm/SCS	1			TBE				
- · oc		2			TBE				
N_{oc} Note2	dBm/15 kHz	1			TBD)			
- · oc		2							
\hat{E}_s/N_{oc}	dB	1	TBD	TBD	TBD	-infinity	TBD	TBD	
		2							
SS-RSRP Note3	dBm/SCS	1	TBD	TBD	TBD	-infinity	TBD	TBD	
		2	TBD	TBD	TBD	-infinity	TBD	TBD	
lo	dBm/95.04 MHz	1	TBD	TBD	TBD	-infinity	TBD	TBD	
	[2	TBD	TBD	TBD	-infinity	TBD	TBD	
Treselection	S	1, 2	0	0	0	0	0	0	
Sintrasearch	dB			Not sent			Not sent		
Propagation Condition		1, 2 Not sent Not sent 1, 2 AWGN							
Note 1: OCNG shall is achieved to	be used such that both 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.

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 RRC CONNECTION REQUEST 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 [TBD] 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 RRC CONNECTION REQUEST message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay shall be less than [TBD] 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: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{\text{evaluate, NR}}$ intra $+ T_{\text{SI-NR}}$,

Where:

 T_{detect, NR_Intra} See Table 4.2.2.3-1 in clause 4.2.2.3

T_{evaluate, NR_ intra} 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; 2560 ms is assumed in this test case.

This gives a total of [TBD] s, allow [TBD] s for the cell re-selection delay to a newly detectable cell and [TBD] s for the cell re-selection delay to an already detected cell in the test case, which we allow [TBD] 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, 100MHz bandwidth,	120 kHz SSB SCS, 100MHz bandwidth, TDD					
	TDD duplex mode	duplex mode					
2	240 kHz SSB SCS, 100MHz bandwidth,	240 kHz SSB SCS, 100MHz bandwidth, TDD					
	TDD duplex mode	duplex mode					
Note: The UE is o	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	Value	Comment
Initial condition	Active cell		configuration 1, 2	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE
T1 end	Active cell		1, 2	Cell1	reselects to cell 1 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	el Number		1, 2	1, 2	
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.
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	nfiguration index		1, 2	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	[TBD]	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2	[TBD]	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	[TBD]	T3 needs to be defined so that cell re- selection 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	Т	DDConf.3.	1	TDDConf.3.1		
PDSCH RMC		1, 2	5	R.3.1 TDD			N/A	
configuration								
RMSI CORESET		1, 2		CR.3.1 TDD)	(CR.3.1 TDD)
parameters								
RMSI CORESET		1, 2	С	CR.3.1 TDI)	С	CR.3.1 TDI	D
RMC configuration								
OCNG Pattern		1, 2		defined in A	.3.2.1	OP.1 (defined in A	.3.2.1
Initial DL BWP		1, 2		DLBWP.0			DLBWP.0	
configuration								
Initial UL BWP		1, 2		ULBWP.0			ULBWP.0	
configuration								
RLM-RS		1, 2		SSB			SSB	
Qrxlevmin	dBm/SCS	1		TBD			TBD	
		2		TBD			TBD	
Pcompensation	dB	1, 2		0			0	
Qhysts	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		TDD		TBD		
				TBD		IBD		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	TBD	TBD	TBD	TBD	-infinity	TBD
$\mathbf{L}_{s}/1_{ot}$		2					, ,	
N_{oc} Note2	dBm/SCS	1		•	TBD)		
TV _{oc}		2			TBD			
N_{oc} Note2	dBm/15 kHz	1			TBD			
TV _{oc}		2						
\hat{E}_s/N_{oc}	dB	1	TBD	TBD	TBD	TBD	-infinity	TBD
$\mathbf{L}_{s}/\mathbf{N}_{oc}$		2					, ,	
SS-RSRP Note3	dBm/SCS	1	TBD	TBD	TBD	TBD	-infinity	TBD
		2	TBD	TBD	TBD	TBD	-infinity	TBD
lo	dBm/95.04 MHz	1	TBD	TBD	TBD	TBD	-infinity	TBD
		2	TBD TBD TBD		TBD	-infinity	TBD	
Treselection	S	1, 2	0	0	0	0	0	0
Sintrasearch	dB	1, 2		TBD			Not sent	
Thresh _{x, high}	dB	1, 2		TBD			TBD	
Thresh _{serving, low}	dB	1, 2		TBD			TBD	
Thresh _{x, low}	dB			TBD			TBD	
Propagation		1, 2 1, 2	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 $^{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.1.1.2.3 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 RRC CONNECTION REQUEST 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 [TBD] 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 RRC CONNECTION REQUEST 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 [TBD] 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:

 $T_{higher_priority_search}$ 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; 2560 ms is assumed in this test case.

This gives a total of [TBD] s, allow [TBD] s for the cell re-selection delay to a higher priority cell and [TBD] s for the cell re-selection delay to a lower priority cell in the test case, which we allow [TBD] 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 [TS38.133 v15.2.1].

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both timing advance adjustment delay and accuracy 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 is 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

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	[TBD]	
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.
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	
T3		S	1	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter	Unit	Се	II 1	Cell 2		
Farameter	Unit	T1	T2	T1	T2	
NR RF Channel Number		1		2		

5	Config 1		FD	DD .	TD	DD .
Duplex mode	Config 2,3		TC		TC	
	Config 1		Not App	olicable	TDDC	onf.3.1
TDD configuration	Config 2		TDDC	onf.1.1	TDDC	onf.3.1
	Config 3		TDDC	onf.2.1	TDDC	onf.3.1
	Config 1		10: N _{RE}	B,c = 52	100: N _R	B,c = 66
BW _{channel}	Config 2	MHz	10: N _{RE}	_{B,c} = 52	100: N _R	_{B,c} = 66
	Config 3		40: N _{RB}	,c = 106	100: N _R	_{B,c} = 66
	Config 1		10: N _{RE}	_{B,c} = 52	100: N _R	_{B,c} = 66
BWP BW	Config 2	MHz	10: N _{RE}	_{B,c} = 52	100: N _R	_{B,c} = 66
	Config 3		40: N _{RB}	_{,c} = 106	100: N _R	_{B,c} = 66
DRx Cycle		ms		Not Ap	plicable	
	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	1	
SMTC configuration	Config 1,2		SMTC.	.1 FR1	SMTC.1 FR2	
SWITO configuration	Config 3		SMTC.	.2 FR1	SMTC.	1 FR2
PDSCH/PDCCH	Config 1,2	kHz	15 kHz		120 kHz	
subcarrier spacing	Config 3	IXI IZ	30 kHz		120 kHz	
PUCCH/PUSCH	Config 1,2	kHz	15 l	кНz	120	kHz
subcarrier spacing	Config 3	KI IZ	30 I		120 kHz	
PRACH configuration			FR1 PRACH configuration		FR2 PRACH configuration	
TRS configuration			TBD		TBD	
BWP configuration	Initial DL BWP		DLBWP.0.1		DLBW	/P.0.1
	Dedicated DL BWP		DLBW		DLBW	
	Initial UL BWP		ULBW		ULBW	
	Dedicated UL BWP		ULBW	/P.1.1	ULBW	/P.1.1
EPRE ratio of PSS to SS						
EPRE ratio of PBCH DM						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		JD.				
EPRE ratio of PDSCH DMRS to SSS		dB	(J	()
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)		ID //				
N _{oc} Note2		dBm/15kH z	TE		TBD	
N_{oc}^{Note2} Config 1,2 Config 3		dBm/SCS	TE TE		TBD TBD	
\hat{E}_s/I_{ot}		dB	TBD	TBD	-Infinity	TBD

\hat{E}_s/N_{oc}		dB	TBD	TBD	-Infinity	TBD
Io ^{Note3}	Config 1,2	dBm/ BW	TBD	TBD	TBD	TBD
	Config 3	dBm/ BW	TBD	TBD	TBD	TBD
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.
- 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 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.7.3.1.1.3 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than [TBD] ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] 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 [TS38.133 v15.2.1].

A.7.3.1.2.2 **Test Parameters**

Supported test configurations are shown in table A.7.3.1.2.2-1. Both timing advance adjustment delay and accuracy 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

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	[TBD]	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Inf	formation	-	Not Sent	No additional delays in random
				access procedure.
Time offset between	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	
T3		S	1	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
Farameter		T1	T2	T1	T2
NR RF Channel Number		•	1	•	1

Duplex mode					DD			
TDD confi	guration				TDDC			
BW _{channel}			MHz		100: N _{RB,c} = 66			
BWP BW			MHz	100: N _{RB,c} = 66				
DRx Cycle	e		ms		Not Applicable			
		easurement channel			SR3.1			
CORESE	T Reference	Channel			CR3.1	I TDD		
OCNG Pa	tterns				OCNG p			
SMTC cor						.1 FR2		
PDSCH/P	DCCH subc	arrier spacing	kHz			kHz		
		arrier spacing	kHz			kHz		
	onfiguration				FR2 PRACH			
TRS confi						BD		
TCI config		I I W I DI DIVID				3D		
BWP conf	iguraiton	Initial DL BWP			DLBW			
		Dedicated DL BWP			DLBW			
		Initial UL BWP Dedicated UL BWP			ULBWP.0.1 ULBWP.1.1			
EDDE roti	o of PSS to				ULDV	/P.1.1		
		DMRS to SSS	}					
		o PBCH DMRS	}					
		I DMRS to SSS		0		0		
		to PDCCH DMRS						
		DMRS to SSS	dB					
	o of PDSCH							
		DMRS to SSS(Note 1)	j					
EPRE ration	o of OCNG	to OCNG DMRS (Note						
1)								
$N_{oc}^{ m Note2}$			dBm/15kH z	TBD		TBD		
37 11 0	Config 1,2)		TF	3D	TBD		
N _{oc} Note2 Config 1,2 Config 3		dBm/SCS	TE			3D		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD		
\hat{E}_s/N_{oc}		dB	TBD	TBD	TBD	TBD		
Io ^{Note3}	Config 1,2	2	dBm/ BW	TBD	TBD	TBD	TBD	
	Config 3		dBm/ BW	TBD	TBD	TBD	TBD	
	on condition		-			GN		
Note 1:	Note 1: OCNC shall be used such that both calls are fully allocated and a constant total transmitted newer anostrol							

- 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: 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 0dBi gain at the centre of the guiet zone
- Note 5: As observed with 0dBi 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 [TBD] 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 = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] 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 [TS38.133 v15.2.1].

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both timing advance adjustment delay and accuracy 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	[TBD]	
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
	G			access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	
T3		S	1	

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	
raidilletei		T1	T2	T1	T2
NR RF Channel Number		1		2	

Duplex mode				TDD				
TDD config	guration				TDDConf.3.1			
BW _{channel}			MHz			RB,c = 66		
BWP BW	BWP BW		MHz		100: N _{RB,c} = 66			
DRx Cycle	DRx Cycle					plicable		
PDSCH Re	eference me	easurement channel			SR3.1			
CORESET	Reference	Channel			CR3.1	I TDD		
OCNG Pat	terns				OCNG p	oattern 1		
SMTC con	figuration				SMTC			
		arrier spacing	kHz			kHz		
		arrier spacing	kHz			kHz		
PRACH co					FR2 PRACH (
TRS config						3D		
TCI configu					TE			
BWP confi	guraiton	Initial DL BWP			DLBV			
		Dedicated DL BWP			DLBV			
		Initial UL BWP			ULBWP.0.1			
		Dedicated UL BWP		ULBWP.1.1				
	of PSS to							
		DMRS to SSS						
		o PBCH DMRS						
		I DMRS to SSS		0		0		
		to PDCCH DMRS	dB					
		I DMRS to SSS						
		I to PDSCH						
		DMRS to SSS(Note 1)						
	of OCNG	to OCNG DMRS (Note						
1)			dBm/15kH					
$N_{oc}^{ m Note2}$			Z Z	TBD		TBD		
N/ Note2	Config 1,2	2		TE	3D	TI	3D	
N _{oc} Note2 Config 1,2 Config 3		dBm/SCS	TE	3D	TI	3D		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	TBD	TBD	TBD	TBD	
\hat{E}_s/N_{oc}		dB	TBD	TBD	TBD	TBD		
Io ^{Note3}	Config 1,2	2	dBm/ BW	TBD	TBD	TBD	TBD	
	Config 3		dBm/ BW	TBD	TBD	TBD	TBD	
Propagation	n condition		-		AW	GN	•	
	00NO -1		II £ - II -	-11 411 -				

- 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: 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 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.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than [TBD] 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 = [TBD] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [TBD]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2 [TS38.133].

This gives a total of [TBD] ms.

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

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, 100MHz 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.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Paramet	ter	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		SR3.1 TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SS	SS	dB		
EPRE ratio of PBCH_DN	MRS to SSS	dB		
EPRE ratio of PBCH to F	EPRE ratio of PBCH to PBCH_DMRS			
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.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

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	Parame	ter	Unit	Test-1	Comments
AoA setup				TBD	As defined in A.x.
SSB with	\hat{E}_s/I_{ot}		dB	3	SSB with index 0 is signalled to be above
index 0	N_{oc}	Config 1,2	dBm/15kHz	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	THESTIDIASSE
	SS-RSR	P Note 2	dBm/ SCS	TBD	
SSB with	\hat{E}_s/I_{ot}		dB	-17	SSB with index 1 is signalled to be below
index 1	N_{oc}	Config 1,2	dBm/15kHz	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	THESHOUSSE
	SS-RSRP Note 2		dBm/ SCS	TBD	
lo Note 1		Config 1,2	dBm	TBD	For symbols without SSB index 1
ss-PBCH-Blo	ockPower		dBm/ SCS	TBD	As defined in clause 6.3.2 in TS 38.331 [2].
Configured l	JE transmitt	ed power (dBm	TBD	As defined in clause
$P_{ m CMAX, f,c}$)				6.2.4 in TS 38.101-2.	
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3.	
Propagation	Condition		-	AWGN	

Note 1: Io level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 2: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.2.1.2.4 Receiving a NACK on msg3

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall NACK *all* UE msg3 following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of a NACK on msg3 until the maximum number of HARQ re-transmissions is reached.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Subclause 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 Subclause 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.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 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

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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, 100MHz 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.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parame	Parameter		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 SS per SS-burst and SS/PBCH block index 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
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 parameters Note 2	Config 1,2		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1
NR RF Channel Number	•		1	1	
EPRE ratio of PSS to SS	SS	dB			
EPRE ratio of PBCH_DN	MRS to SSS	dB			
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_DMRS to SSS		dB	0	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB			
EPRE ratio of PDSCH_E		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 achiev 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

Parameter		Unit	Test-1	Test-2	Comments	
AoA setup	AoA setup			TBD	TBD	As defined in A.x.
SSB with	\hat{E}_s/I_{ot}	\hat{E}_s/I_{ot}		3	3	SSB with index 0 is signalled to be above
index 0	N_{oc}	Config 1,2	dBm/15kHz	TBD	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	THESHOUSSE
	SS-RSR	P Note 2	dBm/ SCS	TBD	TBD	
SSB with	\hat{E}_s/I_{ot}	\hat{E}_s/I_{ot}		-17	-17	SSB with index 1 is signalled to be below
index 1	N_{oc}	Config 1,2	dBm/15kHz	TBD	TBD	configured rsrp- ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	-17	THIESHOUSSE
	SS-RSR	P Note 2	dBm/ SCS	TBD	TBD	
Io Note 1 Config 1,2		dBm	TBD	TBD	For symbols without St index 1	
ss-PBCH-BlockPower		dBm/ SCS	TBD	TBD	As defined in clause 6.: in TS 38.331 [2].	
Configured UE transmitted power (dBm	TBD	TBD	As defined in clause 6.2 in TS 38.101-2.	
$P_{\text{CMAX, f,c}}$)					111 13 30.101-2.	
PRACH Configuration			FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3	
Propagation Condition		-	AWGN	AWGN		

Note 1: lo level has been derived from other parameters for information purpose. It is not a settable parameter.

Note 2: RSRP level has been derived from other parameters for information purposes. It is not a settable parameter.

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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 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 Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in subclause 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 Subclause 6.2.2.2. The power of the first preamble shall be [TBD] dBm 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 Subclause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

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	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120kHz, BW 100MHz	
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120kHz, BW 100MHz	

For this test a single NR cell is used. Table A.7.4.1.1.1-2 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.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

	ameter	Unit	Config	Test1	Test2
E-UTRA Channel Number			1,2	1	1
NR Channel Number			1,2	2	2
TDD configuration			1	TDDC	onf.1.2
BW _{channel}		MHz	1,2	100: NR	B,c = 66
DWD	DL BWP		1,2	DLBV	/P.1.1
BWP	UL BWP		1,2	ULBV	/P.1.1
DRx Cycle	•	ms	1,2	N/A	320 ^{Note5}
PDSCH Re measureme	eference ent channel		1,2	SR.3.	1 TDD
RMSI COR Reference			1,2	CR.3.	1 TDD
Dedicated (Reference			1,2	CCR.3	.1 TDD
OCNG Patt	terns		1,2	OF	P.1
SSB Config	guration		1,2	SSB.:	2 FR2
SMTC conf	iguration		1,2	SMTC.2	
TCI configu	ıration		1,2	TBD	
TRS config	uration		1,2	TBD	
PBCH DMF EPRE ratio DMRS to S EPRE ratio PDCCH DM EPRE ratio DMRS to S EPRE ratio PDSCH EPRE ratio DMRS to S EPRE ratio PDSCH EPRE ratio DMRS to S EPRE ratio	of PBCH SS of PBCH to RS of PDCCH SS of PDCCH to MRS of PDSCH SS of PDSCH to of OCNG SS(Note 1) of OCNG to	dB	1,2	0	0
Note2	RS (Note 1)	dBm/15 kHz	1,2	TBD	TBD
Note2		dBm/SCS	1,2	TBD	TBD
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			1,2	3	3
$\hat{E}_{\scriptscriptstyle s}/N_{\scriptscriptstyle oc}$			1,2	3	3
SS-RSRP ^{Note3}		dBm/SCS	1,2	TBD	TBD

Io ^{Note3}	dBm/95MHz	1,2	TBD	TBD
Propagation condition		1,2	AW	GN
SRS Config		1,2	Config1 ^{Note6}	Config2 ^{Note6}

Table A.7.4.1.1-3 SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceIdList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
	SRS-ResourceSetId	0	0	
SRS-Resource	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping	0	0	
	startPosition			
	resourceMapping	n1	n1	
	nrofSymbols			
	resourceMapping	n1	n1	
	repetitionFactor			
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping	sl1	sl1	
	c-SRS			
	freqHopping	0	0	
	b-SRS			
	freqHopping	0	0	
	b-hop			
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1	sl640	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.7.4.1.1.4: DRX-Configuration for UL Timing Tests.

Field	Test 1	
Field	Value	
drx-onDurationTimer	[ms6]	
drx-InactivityTimer	[ms1]	
drx-RetransmissionTimerDL	[sl1]	
drx-RetransmissionTimerUL	[sl1]	
longDRX-CycleStartOffset	[ms320]	
shortDRX	disable	

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 $(N_{TA} + N_{TA_offset}) \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600 for FR1 and 13792 for FR2
 - 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.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjı	ıstment Value
	Test1	Test2
15	+64*64Tc	+32*64T _c
30	+32*64T _c	+16*64T _c
120	+16*64T _c	+8*64T _c
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 Section 7.1.2 Table 7.1.2-3. This will only be done for Test1.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \pm T_e$ of the first detected path of DL SSB. For Test 2 and Test 4 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 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, 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, 100MHz 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	
DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.1-1
UL BWP		ULBWP.1.1	As specified in Table A.3.9.2.2-1
TRS		TBD	TBD
TCI configuration		TBD	TBD
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_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	$N_{TA_new} = N_{TA_old} + 8192 *T_c$ (based on equation in TS 38.213 [3] section 4.2)
T1	S	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1	
raidilletei	Offic	T1	T2

Duplex mode		TDD	
TDD configuration		TDDConf.3.1	
BW _{channel}	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	
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			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note			
1)			
UE orientation around TBD axis and TBD	degrees	TBD	
axis			
N_{oc} Note2	dBm/15kH	TBD	
- ' oc	Z		
$N_{oc}^{}$ Note2	ID (0.00	TBD	
	dBm/SCS		
\hat{E}_{s}/I_{ot}	dB	TBD	
\hat{E}_s/N_{oc}	dB	TBD	
IoNote3	dBm/	TBD	
	95.04MHz		
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.

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

7	2	7
•	J	•

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	
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	nonCodebook	Non-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 slots after the reception of the timing advance command, where k = 24.

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 section, 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.

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 2.

Editor note: whether to revise power level to be gradually changed

Editor note: Further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power level of 2nd SSB

Editor note: AoA setting needs to be updated.

Editor note: test cases may need to be revised for 2 AoA

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

Config	uration	Description			
1		TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100MHz			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR2				

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	Test 2	
Active PCell	Active PCell			Cell 1	Cell 1	
RF Channel Num	ber			1	1	
Duplex mode				TDD	TDD	
TDD Configuratio	n	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
CORESET Refere	ence	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
SSB Configuration	on	Config 1		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]	
SMTC Configura	tion	Config 1		Table A.3.2.3.1-1	Table A.3.2.3.1-1	
PDSCH/PDCCH subcarrier spacing	g	Config 1		120 KHz	120 KHz	
PRACH Configura	ation	Config 1		TBD	TBD	
SSB index assign	ed as	Config 1		TBD	TBD	
OCNG parameter	'S			TBD	TBD	
CP length				Normal	Normal	
Correlation Matrix Configuration	and An	tenna		[2x2 Low]	[2x2 Low]	
J	DCI fo	ormat		1-0	1-0	
Out of sync		er of Control I symbols		2	2	
transmission	Aggre	gation level	CCE	8	8	
parameters	parameters Ratio of hypothetical PDCCH RE e to average SS: energy		dB	4	4	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4	4	
	DMRS precoder granularity			REG bundle size	REG bundle size	
	REG bundle size			6	6	
DRX	DRX			OFF	OFF	
Gap pattern ID			[N.A.]	*[<i>gp0</i>]		
Layer 3 filtering				Enabled	Enabled	
T310 timer		ms	0	0		
T311 timer			ms	1000	1000	
N310 N311				1 1	<u> </u>	
NZP CSI-RS conf	figuratio	n		TBD	TBD	

ZP CSI-RS configuration			TBD	TBD
CSI-IM configuration			TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting	Config 1	slot	[40]	[40]
periodicity	J	SIUL	[40]	[40]
NZP CSI-RS configuration	n		TBD	TBD
ZP CSI-RS configuration			TBD	TBD
CSI-IM configuration			TBD	TBD
T1		S	TBD	TBD
T2		S	TBD	TBD
T3		S	TBD	TBD
D1		S	TBD	TBD

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

Para	meter	Unit		Test 1			Test 2		
		ĺ	T1	T2	T3	T1	T2	T3	
UE orienta	tion around	degrees		TBD			TBD		
TBD axis a	nd TBD axis								
PDCCH_b	eta	dB		4			4		
PDCCH_D	MRS_beta	dB		4			4		
PBCH_beta	a	dB							
PSS_beta		dB							
SSS_beta		dB		0			0		
PDSCH_be	eta	dB							
OCNG_bet	a	dB							
SNR	Config 1	dB	[1]	[-7]	[-15]	[1]	[-7]	[-15]	
N_{oc}	-	dBm/15 KHz	TBD TBD						
Propagatio	n condition		[TI	DL-A 30ns 75	Hz]	[TI	DL-A 30ns 75	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.7.5.1.1.1-1.

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.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 2
Field	Value
gapOffset	[0]

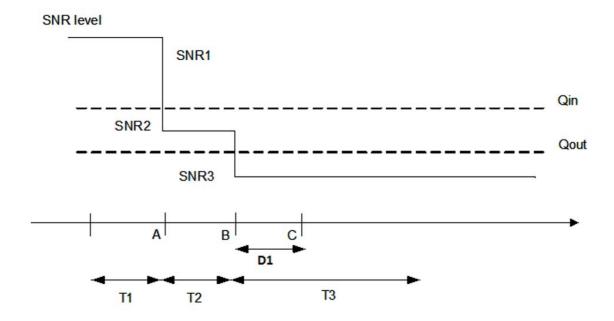


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

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.

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, A.7.5.1.2.1-3, and A.7.5.1.2.1-4 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.7.5.1.2.1-1 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. UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Editor note: whether to revise power level to be gradually changed

Editor note: Further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power levelof the 2nd SSB

Editor note: AoA setting needs to be updated.

Editor note: test cases may need to be revised for 2 AoA

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Config	guration	Description			
1		TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100MHz			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Parameter		Unit	Value			
			Test 1	Test 2		
Active PCell			Cell 1	Cell 1		
RF Channel Numb	er		1	1		
Duplex mode			TDD	TDD		
TDD Configuration	Config 1 guration		[TDDConf.3.1]	[TDDConf.3.1]		
CORESET Reference Channel	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
SSB Configuration	Config 1		[Table A.3.2.2.2.1-1]	[Table A.3.2.2.2.1-1]		
SMTC Configuration	Config 1		Table A.3.2.3.1-1	Table A.3.2.3.1-1		
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	120 KHz		
PRACH Configuration	Config 1		TBD	TBD		
SSB index assigned as RLM RS	Config 1		TBD	TBD		
OCNG parameters			Table A.3.2.1.1-1	Table A.3.2.1.1-1		
CP length			Normal	Normal		
Correlation Matrix Configuration	and Antenna		[2x2 Low]	[2x2 Low]		
	DCI format		1-0	1-0		
Out of sync	Number of Control OFDM symbols		2	2		
transmission	Aggregation level	CCE	8	8		
parameters	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4	4		
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4	4		
DMRS precoder granularity			REG bundle size	REG bundle size		
227	REG bundle size		6	6		
DRX			OFF	OFF		
Gap pattern ID Layer 3 filtering			[N.A.] Enabled	*[gp0] Enabled		
T310 timer		ms	0	0		
T311 timer		ms	1000	1000		
N310			1	1		
N311			1	1		
NZP CSI-RS config	guration		TBD	TBD		

ZP CSI-RS config	uration		TBD	TBD
CSI-IM configurati	on		TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting periodicity	Config 1	slot	[40]	[40]
NZP CSI-RS confi	iguration		TBD	TBD
ZP CSI-RS config	uration		TBD	TBD
CSI-IM configurati	CSI-IM configuration		TBD	TBD
T1		S	TBD	TBD
T2		S	TBD	TBD
T3		S	TBD	TBD
D1		S	TBD	TBD

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						Test 2		
			T1	T2	T3	T4	T5	T1	T2	Т3	T4	T5
UE orientat	ion around	degree		TBD					TBD			
TBD axis a	nd TBD	S										
axis												
PDCCH_be	eta	dB		4 4								
PDCCH_DI	MRS_beta	dB		4					4			
PBCH_beta	а	dB										
PSS_beta		dB										
SSS_beta		dB			0					0		
PDSCH_be	eta	dB										
OCNG_beta	а	dB										
SNR	Config 1	dB	[1]	[-7]	[-15]	[-4.5]	[1]	[1]	[-7]	[-15]	[-4.5]	[1]
N_{oc}		dBm/15	TBD TBD									
1 oc		KHz										
Propagation	n 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 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.7.5.1.2.1-1.

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 section [A.3.6].

Table A.7.5.1.2.1-4: Measurement gap configuration for in-sync tests in non-DRX mode.

Field	Test 2
Fleiu	Value
gapOffset	[TBD]

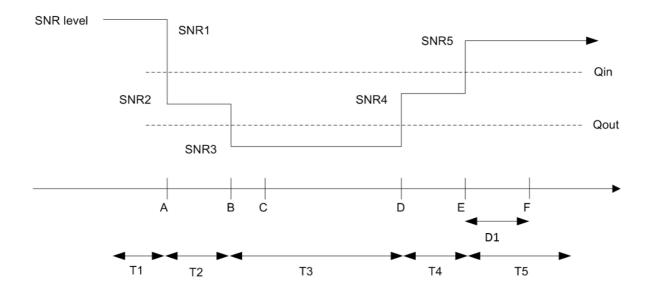


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

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.

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, A.7.5.1.3.1-3, A.7.5.1.3.1-4, and A.7.5.1.3.1-5. 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

Editor note: whether to revise power level to be gradually changed

Editor note: Further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power levelof the 2nd SSB

Editor note: AoA setting needs to be updated.

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 100MHz			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

	Value			
Parameter			Unit	Test 1
				1001
Active PCell				Cell 1
RF Channel Number				1
Duplex mode TDD Configuration Config 1				TDD [TDDConf.3.1]
CORESET Referen	ce	Config 1		[CR. 3.1 TDD]
SSB Configuration		Config 1		[Table A.3.2.2.2.1-1]
PDSCH/PDCCH su	bcarrier	Config 1		120 KHz
spacing		-		
SMTC Configuration		Config 1		Table A.3.2.3.1-1
PDSCH/PDCCH sul	bcarrier	Config 1		120 KHz
spacing PRACH Configuration	on	Config 1		TBD
SSB index assigned		Config 1		TBD
RLM RS	. uo	Coming 1		.55
OCNG parameters				Table A.3.2.1.1-1
CP length				Normal
Correlation Matrix a				[2x2 Low]
	DCI for	mat er of Control OFDM		1-0 2
Out of sync	symbol			4
transmission	Aggreg	ation level	CCE	8
parameters		f hypothetical PDCCH	dB	4
		ergy to average SSS RE		
	energy			
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy		dB	4
			ub	4
	DMRS precoder granularity			REG bundle size
REG bundle size				6
DRX cycle	111200	arraio 0120		640
Gap pattern ID				[N.A.]
Layer 3 filtering				Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310z				1
N311				1
NZP CSI-RS config	uration			TBD
7D 001 D0 "	•			TDD
ZP CSI-RS configur	ation			TBD
001111				
CSI-IM configuration	n			TBD
Periodic CSI reporting				PUCCH
CSI reporting periodicity Config 1		slot	[40]	
Joi roporting period		2011119 1	SIOL	[بم]
NZP CSI-RS configuration				TBD
ZP CSI-RS configuration				TBD
CSI-IM configuration	n			TBD
T1			S	TBD
T2 T3			S S	TBD TBD
D1			S	TBD
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.7.5.1.3.1-3: 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
UE orientation	around TBD axis	degrees	TBD		
and TBD axis					
PDCCH_beta		dB		4	
PDCCH_DMF	RS_beta	dB		4	
PBCH_beta	PBCH_beta				
PSS_beta		dB			
SSS_beta		dB			
PDSCH_beta		dB			
OCNG_beta		dB		0	
SNR	NR Config 1		[1]	[-7]	[-15]
N_{oc}		dBm/15 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 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.7.5.1.3.1-1.
- 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.7.5.1.3.1-4: DRX-Configuration for out-of-sync tests

Field	Test 1
	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-RetransmissionTimerDL	[sl1]
drx-RetransmissionTimerUL	[sl1]
drx-LongCycle	[ms640]
drx-StartOffset	[ms0]
shortDRX	disable

Table A.7.5.1.3.1-5: TimeAlignmentTimer -Configuration for out-of-sync testing

Field	Test1	
Field	Value	
TimeAlignmentTimer	[Infinity]	
periodicityAndOffset in		
SchedulingRequestResourceCo	[sl40]	
nfig		

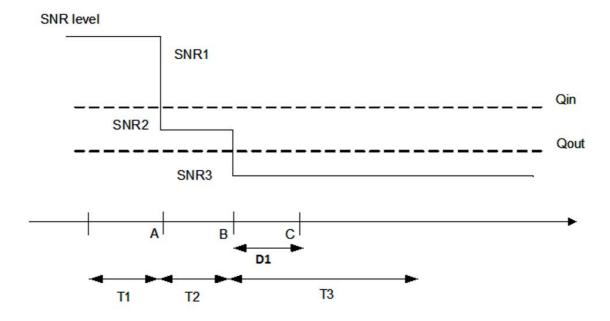


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

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.

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, A.7.5.1.4.1-3, A.7.5.1.4.1-4, and A.7.5.1.4.1-5. 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: whether to revise power level to be gradually changed

Editor note: Further to revise the SSB configuration to be 2 SSBs and FFS the corresponding power levelof 2nd SSB

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 100MHz			
Note: The UE is only required to pass in one of the supported test				
configur	ations in FR2			

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

	Paran	neter	Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Number Duplex mode				1 TDD
	TDD Configuration			[TDDConf.3.1]
1 DD Connigure	. 2 2 comigaranon			[18800111.0.1]
CORESET		Config 1		[CR. 3.1 TDD]
Reference Cha	annel			
SSB Configur	ation	Config 1		[Table A.3.2.2.2.1-1]
SMTC Configuration	1	Config 1		Table A.3.2.3.1-1
PDSCH/PDCC subcarrier spa		Config 1		120 KHz
PRACH Configuration		Config 1		TBD
SSB index ass	signed	Config 1		TBD
OCNG parame	eters			Table A.3.2.1.1-1
CP length				Normal
Correlation Ma	atrix an	d Antenna		[2x2 Low]
Configuration	DCL	format		1.0
In sync transmission		ber of Control		1-0 2
parameters		M symbols		_
		egation level	CCE	4
		o of hypothetical	dB	0
		CH RE energy to age SSS RE		
	energ	-		
		of hypothetical	dB	0
		CH DMRS energy erage SSS RE		
	ener			
	DMR	S precoder		REG bundle size
		ularity		
Out of sync		bundle size		6
transmission		format ber of Control		1-0 2
parameters		M symbols		_
		egation level	CCE	8
		of hypothetical	dB	4
		CH RE energy to age SSS RE		
	ener	-		
		of hypothetical	dB	4
	PDC	CH DMRS energy		
		erage SSS RE		
	energy DMRS precoder			REG bundle size
granularity				
REG bundle size				6
DRX cycle	`		ms	40 [N. A. 1
Gap pattern ID Layer 3 filtering				[N.A.] Enabled
NZP CSI-RS co				TBD TBD
CSI-IM configu				TBD
Periodic CSI re			PUCCH	
CSI reporting		Config 1	slot	[40]
periodicity				

NZP CSI-RS configuration		TBD		
ZP CSI-RS configuration		TBD		
CSI-IM configuration		TBD		
T1	S	TBD		
T2	S	TBD		
T3	S	TBD		
T4	S	TBD		
T5	S	TBD		
D1	S	TBD		
Note 1. All configurations are assigned to the LIE prior to the start of time				

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.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
UE orienta	tion around TBD	degrees			TBD		
axis and T	BD axis						
PDCCH_b	eta	dB			4		
PDCCH_D	MRS_beta	dB			4		
PBCH_bet	а	dB					
PSS_beta		dB					
SSS_beta		dB	0				
PDSCH_b	eta	dB					
OCNG_be	ta	dB					
SNR	Config 1	dB	[1] [-7] [-15] [-4.5]				[1]
N_{oc}		dBm/15	TBD				
1 oc		KHz					
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 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.7.5.1.4.1-1.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 section [A.3.6].

Table A.7.5.1.4.1-4: DRX-Configuration for in-sync tests

Field	Test 1
Field	Value
drx-onDurationTimer	[ms6]
drx-InactivityTimer	[ms1]
drx-	[sl1]
RetransmissionTimerDL	
drx-	[sl1]
RetransmissionTimerUL	
drx-LongCycle	[ms40]
drx-StartOffset	[ms0]
shortDRX	disable

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Table A.7.5.1.4.1-5: TimeAlignmentTimer -Configuration for in-sync testing

Field	Test 1 Value
TimeAlignmentTimer	infinity
periodicityAndOffset in SchedulingRequestResourceConfig	[sl40]

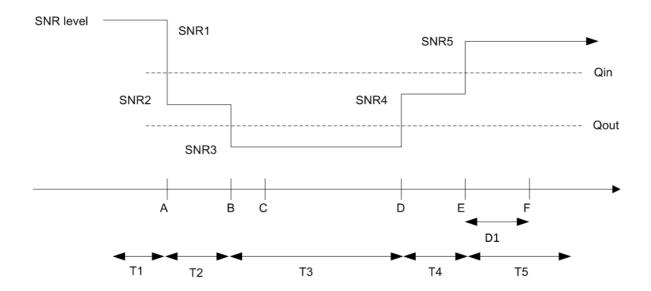


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

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, and A.7.5.1.5.1-3 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 insync 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 test2.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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	Test 2	
Active PCell			Cell 1	Cell 1	
RF Channel	Number		1	1	
	Duplex mode Config 1		TDD	TDD	
TDD Configuration	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
CORESET Reference	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Channel					
SSB Configuration	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC Configuration	Config 1		TDD	TDD	
PDSCH/PDC H subcarrier spacing			120 KHz	120 KHz	
	assigned as RLM		[0]	[0]	
OCNG paran	neters		TBD	TBD	
CP length			Normal	Normal	
Correlation N Configuration	Matrix and Antenna		[2x2 Low]	[2x2 Low]	
J	DCI format		1-0	1-0	
Out of sync	Number of Control OFDM symbols		2	2	
transmissio n	Aggregation level	CC E	8	8	
parameters	Ratio of hypothetical	dB	4	4	
	PDCCH RE energy to average CSI-RS RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average	dB	4	4	
	CSI-RS RE energy DMRS precoder		REG bundle size	REG bundle size	
	granularity REG bundle size		6	6	
DRX			OFF	OFF	
Gap pattern Layer 3 filteri			[N.A.] Enabled	*[gp0] Enabled	
T310 timer		ms	0	0	
T311 timer		ms	1000	1000	
N310		1	1	1	
N311			1	1	
NZP CSI-RS	configuration		[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS configuation			TBD	TBD	
``	CSI-IM configuration		TBD	TBD	
Periodic CSI reporting			PUCCH	PUCCH	
CSI reporting periodicity	Config 1	slot	[10]	[10]	
T1	1	s	1	1	
T2		S	0.4	0.4	
T3		S	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	
Note 1: UI	E-specific PDCCH is n	ot transr	nitted after T1 starts.		

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

Parameter		Unit	Test 1			Test 2		
			T1	T2	T3	T1	T2	Т3
PDCCH_beta		dB		4			4	
PDCCH_DMRS_bet		dB		4			4	
а								
PBCH_beta		dB						
PSS_beta		dB						
SSS_beta		dB					0	
PDSCH_beta		dB		0				
OCNG_beta		dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc} Config 1		dBm/	[-98]			[-98]		
1 oc		15K						
		Hz						
Propagation			[TDL-C 300ns 100Hz]			[TDL-C 300ns 100Hz]		
condition								

- 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.7.5.1.5.1-3: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Test 2 Value		
	gapOffset	[0]	
Note 1:	RLM RS is partially overlapped with		
	measurement gap		

Table A.7.5.1.5.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1		
	Value	Value		
frequencyD omainAlloca tion ^{Note 2}	row1	row2		
startingRB	0	0		
nrofRBs	Note 2	Note 2		
Note 1: TC 20 211 [6] toble 7 / 1 F 2 1				

Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.7.5.1.5.1-1

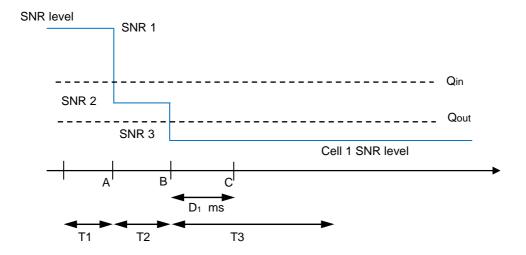


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

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 ($D_1 = [TBD]$ 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.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, A.7.5.1.6.1-3, A.7.5.1.6.1-4, A.7.5.1.6.1-5, and A.7.5.1.6.1-6 below. There is one cells, cell 1 which 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 4.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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

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Parameter		Unit Value				
				Test 3	Test 4	
Active PCell				Cell 1	Cell 1	
RF Channel				1	1	
Duplex mode	Э	Config 1		TDD	TDD	
TDD	_	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configuration CORESET	1	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
Reference Channel		Coming 1		[011. 3.1 100]	[OK. 3.1 100]	
SSB Configuration	n	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC Configuration	n	Config 1		TDD	TDD	
PDSCH/PDC H subcarrier spacing	CC	Config 1		120 KHz	120 KHz	
	assi	gned as RLM		[0]	[0]	
OCNG parar	neter	S		TBD	TBD	
CP length				Normal	Normal	
Correlation N Configuration	n	and Antenna		[2x2 Low]	[2x2 Low]	
		format		1-0	1-0	
Out of sync		nber of Control DM symbols		2	2	
transmissio n	Agg	regation level	Б	8	8	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy		dB	4	4	
	hyp PD(ene	io of othetical CCH DMRS rgy to average -RS RE energy	dB	4	4	
	DMRS precoder granularity			REG bundle size	REG bundle size	
	REG bundle size			6	6	
		format		1-0	1-0	
In sync	Number of Control OFDM symbols			2	2	
transmissio n	Agg	regation level	CC E	4	4	
parameters	hyp PD(to a	io of othetical CCH RE energy verage CSI-RS energy	dB	0	0	
	Rati hyp PD0 ene	io of othetical CCH DMRS rgy to average -RS RE energy	dB	0	0	
	DM	RS precoder nularity		REG bundle size	REG bundle size	
		G bundle size		6	6	
DRX				OFF	OFF	
Gap pattern				[N.A.]	*[<i>gp0</i>]	
Layer 3 filter	ing		pa c	Enabled	Enabled	
T310 timer T311 timer			ms ms	<i>0</i> 1000	<i>0</i> 1000	
N310			1113	1	1	
N310		1	•	•		

N311			1	1
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]
ZP CSI-RS configuation			TBD	TBD
CSI-IM configur	CSI-IM configuration		TBD	TBD
Periodic CSI reporting			PUCCH	PUCCH
CSI reporting periodicity			[10]	[10]
T1		S	1	1
T2		S	0.4	0.4
T3		S	[0.6]	[0.6]
D1		S	[0.24]	[0.44]
Note 1: UE-s				

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

Parameter		Unit		Test 3			Test 4	
			T1	T2	T3	T1	T2	T3
PDCCH_beta		dB		4			4	
PDCCH_	DMRS_bet	dB		4			4	
а								
PBCH_b	eta	dB						
PSS_bet	а	dB						
SSS_bet	SSS_beta		0			0		
PDSCH_	beta	dB						
OCNG_b	eta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/		[-98]			[-98]	
TVoc		15K						
Hz		Hz						
Propagation condition			[TD	L-C 300ns 100)Hz]	[TC	DL-C 300ns 100	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 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.7.5.1.6.1-1.
- 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.7.5.1.6.1-3: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field			
	gapOffset	[0]		
Note 1:	RLM RS is partially overlap	oped with		
	measurement gap			

Table A.7.5.1.6.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0 Value	Resourceld 1 Value
frequencyD omainAlloca tion ^{Note 2}	row1	row2
startingRB	0	0
nrofRBs	Note 2 Note 2	
	7.4.1.5.3-1 based on the	

Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.7.1.6.1-1

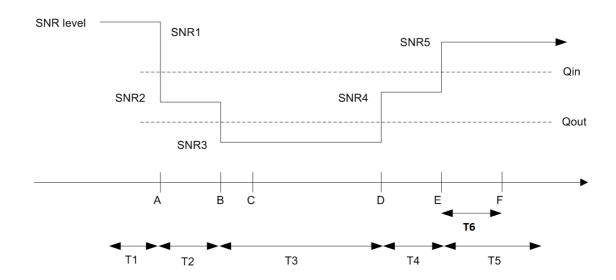


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

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 (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.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 insync 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 6.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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				alue	
		J	Test 5	Test 6	
Active PCell			Cell 1	Cell 1	
RF Channel			1	1	
Duplex mode	e Config 1		TDD	TDD	
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
Configuration					
CORESET Reference Channel	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]	
SSB Configuration	Config 1		TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)	
SMTC Configuration	Config 1		TDD	TDD	
PDSCH/PDC H subcarrier spacing			120 KHz	120 KHz	
	assigned as RLM		[0]	[0]	
OCNG paran	neters		TBD	TBD	
CP length			Normal	Normal	
	Matrix and Antenna		[2x2 Low]	[2x2 Low]	
	DCI format		1-0	1-0	
Out of sync	Number of Control OFDM symbols		2	2	
transmissio n	Aggregation level	CC E	8	8	
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			640	640	
Gap pattern			[N.A.]	*[<i>gp0</i>]	
Layer 3 filteri	ing		Enabled	Enabled	
T310 timer		ms	0	0	
T311 timer		ms	1000	1000	
N310			1	1	
N311		1	<u>.</u> 1	1	
	configuration	1	[Resourceld 1]	[Resourceld 0]	
ZP CSI-RS configuration		+	TBD	TBD	
CSI-IM configuration			TBD	TBD	
Periodic CSI reporting			PUCCH	PUCCH	
CSI reporting Config 1 periodicity		slot	[10]	[10]	
T1	<u> </u>	s	1	1	
T2		s	0.4	0.4	
T3		s	[0.6]	[0.6]	
D1		S	[0.24]	[0.44]	
	F-specific PDCCH is no			נייבין	
	E-specific PDCCH is no	0		s [0.24] t transmitted after T1 starts.	

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 5				Test 6	
			T1	T2	T3	T1	T2	T3
PDCCH_beta		dB		4			4	
PDCCH_	DMRS_bet	dB		4			4	
а								
PBCH_b	eta	dB						
PSS_bet	а	dB						
SSS_bet	а	dB	0			0		
PDSCH_	beta	dB						
OCNG_b	eta	dB						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc} Config 1		dBm/		[-98]			[-98]	
1 oc		15K						
Hz		Hz						
Propagat condition			[TD	L-C 300ns 100)Hz]	[TD	L-C 300ns 100	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 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].

Table A.7.5.1.7.1-3: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode

	Field	Test 6		
	Field			
	gapOffset	[0]		
Note 1:	RLM RS is partially overlage	oped with		
	measurement gap			

Table A.7.5.1.7.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode

Resourceld Resourceld

	Nesourceiu	ivesoni cein	
Field	0	1	
	Value	Value	
frequencyD omainAlloca tion ^{Note 1}	row1	row2	
startingRB	0	0	
nrofRBs	Note 2	Note 2	
Note 2: nro			

Table A.7.5.1.7.1-5: DRX-Configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

Table A.7.5.1.7.1-6: TimeAlignmentTimer -Configuration for FR2 CSI-RS out-of-sync radio link monitoring in DRX mode.

Field		Test 5 Value	Test 6 Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in SchedulingRequestResourc eConfig	Config 1	[sl5]	[sl5]

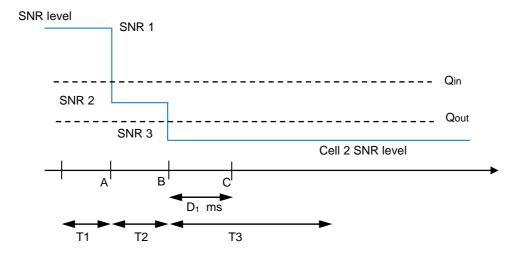


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

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 ($D_1 = [TBD]$ 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.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 Insync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.81-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1 which 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. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 7.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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 7	Test 8		
Active PCell			Cell 1	Cell 1		
RF Channel			1	1		
Duplex mode			TDD	TDD		
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]		
Configuration CORESET	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
Reference Channel	Coming 1		[011. 3.1 100]	[014. 3.1 100]		
SSB Config 1 Configuration			TBD (Note: periodicity is 20ms)	TBD (Note: periodicity is 20ms)		
SMTC Configuration	Config 1		TDD	TDD		
PDSCH/PDC H subcarrier spacing	C Config 1		120 KHz	120 KHz		
	assigned as RLM		[0]	[0]		
OCNG paran	neters		TBD	TBD		
CP length			Normal	Normal		
Correlation M Configuration			[2x2 Low]	[2x2 Low]		
DCI format Number of Control			1-0	1-0		
Out of sync	OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	8	8		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	4		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	4		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
	DCI format		1-0	1-0		
In sync	Number of Control OFDM symbols		2	2		
transmissio n	Aggregation level	CC E	4	4		
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0		
	DMRS precoder granularity		REG bundle size	REG bundle size		
	REG bundle size		6	6		
DRX			640	640		
Gap pattern			[N.A.]	*[<i>gp0</i>]		
Layer 3 filteri	ng		Enabled	Enabled		
T310 timer T311 timer		ms ms	<i>0</i> 1000	<i>0</i> 1000		
N310		1113	1	1		

N311	N311		1	1
NZP CSI-RS configuration			[Resourceld 1]	[Resourceld 0]
ZP CSI-RS configuation			TBD	TBD
CSI-IM configur	CSI-IM configuration		TBD	TBD
Periodic CSI rep	Periodic CSI reporting		PUCCH	PUCCH
CSI reporting periodicity			[10]	[10]
T1		S	1	1
T2		S	0.4	0.4
T3	T3		[0.6]	[0.6]
D1 s		S	[0.24]	[0.44]
Note 1: UE-s	pecific PDCCH is	not transmitte	ed 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 7			Test 8	
			T1	T2	T3	T1	T2	Т3
PDCCH_beta		dB		4			4	
PDCCH_	DMRS_bet	dB		4			4	
а								
PBCH_b	eta	dB						
PSS_bet	а	dB						
SSS_bet	а	dB						
PDSCH_	beta	dB						
OCNG_b	eta	dB		0			0	
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/		[-98]			[-98]	
1 voc		15K						
		Hz						
Propagat condition			[TD	L-C 300ns 100)Hz]	[TD	L-C 300ns 100	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 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.7.5.1.8.1-1.
- 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.7.5.1.8.1-3: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Test 8			
rieiu	Value			
gapOffset	[0]			
Note 1: RLM RS is partially overlappe	ed with			
measurement gap				

Table A.7.5.1.8.1-4: NZP-CSI-RS resource configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

Field	Resourceld 0	Resourceld 1		
	Value	Value		
frequencyD omainAlloca tion ^{Note 1}	row1	row2		
startingRB	0	0		
nrofRBs	Note 2	Note 2		
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.7.5.1.8.1-1				

Table A.7.5.1.8.1-5: DRX-Configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode.

Field	Test 5	Test 6
rieid	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable

Table A.7.5.1.8.1-6: TimeAlignmentTimer -Configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

Field		Test 5 Value	Test 6 Value
TimeAlignmentTimer		infinity	infinity
periodicityAndOffset in SchedulingRequestResourc eConfig	Config 1	[sl5]	[sl5]

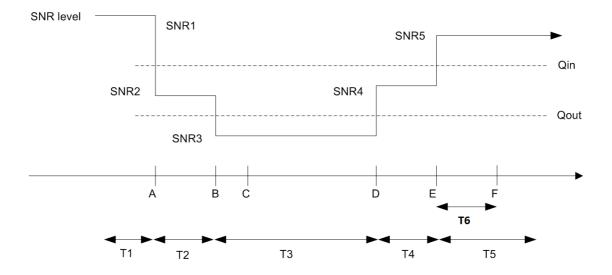


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

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 (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.7.5.2 Interruption

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for FR2 SCell with the active serving cell in the same FR2 band

A.7.5.3.1.1 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 section 8.3, when the SCell in FR2 and the active serving cell is in the same FR2 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 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. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There is one NR carrier with two cells. 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, 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 section 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 $(n+1+\lceil T_{HARO} \rceil +3ms)$ to $(n+1+\lceil T_{HARO} +3ms+T_{SSB} \rceil +3ms)$ and defined in section 8.3.

Time period T3 starts when a MAC message for deactivation of SCell is received at a slot # denoted m. The UE shall carry out deactivation of the SCell in a slot ($m+[T_{HARQ}+3ms]$), as defined in section 8.3, and any PCell interruption due to the deactivation shall occur in the slot ($m+1+[T_{HARQ}]$) to ($m+1+[T_{HARQ}+3ms]$), as defined in section 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.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
Note: The UE is	s only required to pass in one of the supported test configurations

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		1	One NR radio channel 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 1
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	ms	k	k is the number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format specified in 38.213
Tcsl_Reporting	ms	[2]	the delay 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 38.331 [2]

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}	l Init	T1		T2		T3	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN		freq2 freq2		fre	freq2		
Duplex mode		TDD		TE	DD	TE	D
TDD configuration		TDDConf.3.1		TDDConf.3.1		TDDConf.3.1	
Initial BWP Configuration		TE	3D	TE	3D	TBD	
BW _{channel}	MHz	100: Na	$_{B,c} = 66$	100: N _F	RB,c = 66	100: Na	$_{B,c} = 66$
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Parameters		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
RMC CORESET Parameters		CCR.3. 1 TDD	-	CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1					
SSB Configuration				SSB.	1 FR2		
SMTC Configuration				SMTC	.1 FR2		
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			()		
EPRE ratio of PDSCH_DMRS to SSS	L GB			`	,		
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
EPRE ratio of OCNG to OCNG DMRS Note							
\hat{E}_s/N_{oc}	dB	TBD	TBD	TBD	TBD	TBD	TBD
Propagation conditions			· · · · · · · · · · · · · · · · · · ·	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: 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

Parameter		l lm it	Т	1	Т	2	Т3		
Para	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2		
Angle of arrival config	nuration		According to table		According to table		According to table		
7 ingle of arrival comit			A.X.X		A.)	₹.X	Α.>	⟨.X	
	NR_TDD_FR2_A								
	NR_TDD_FR2_B								
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz	+	3D	TBD		TBD		
1 voc	NR_TDD_FR2_G	ubili/10ki12	'-						
	NR_TDD_FR2_T								
	NR_TDD_FR2_Y								
	NR_TDD_FR2_A								
	NR_TDD_FR2_B		TBD		TBD		TBD		
N_{oc} Note1	NR_TDD_FR2_F	dBm/SCS							
TV _{oc}	NR_TDD_FR2_G	ubili/SCS							
	NR_TDD_FR2_T								
	NR_TDD_FR2_Y								
	NR_TDD_FR2_A								
	NR_TDD_FR2_B								
CC DCDDNote2	NR_TDD_FR2_F	dBm/SCS	TDD	TDD	TDD	TDD	TDD	TDD	
SS-RSRP ^{Note2}	NR_TDD_FR2_G	Note3	TBD	TBD	TBD	TBD	TBD	TBD	
	NR_TDD_FR2_T	1							
	NR_TDD_FR2_Y								

\hat{E}_{s}/I_{ot}		dB	TBD	TBD	TBD	TBD	TBD	TBD	
	NR_TDD_FR2_A								
	NR_TDD_FR2_B								
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04		TDD		TDD		TBD	
10.10.02	NR_TDD_FR2_G	MHz Note4	TBD		TBD		10	טפ	
	NR_TDD_FR2_T								
	NR_TDD_FR2_Y								
Note 1:	Interference from other cells and	noise sources n	ot specified	in the tes	t is assum	ed to be co	onstant ove	er	
	subcarriers and time and shall be	modelled as AV	VGN of app	oropriate p	ower for N	V_{oc} to be fu	ulfilled.		
Note 2:	SS-RSRP and lo levels have bee	n derived from c	ther param	neters for i	nformation	purposes.	They are	not	
Note 3:	settable parameters themselves. SS-RSRP minimum requirements are specified assuming independent interference and noise at each rece antenna port.						receiver		

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.7.5.3.1.2 Test Requirements

The test requirements defined in section A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [5ms+ T_{SMTC_SCell}] as defined in section 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR2 SCell with no active serving cell in the same FR2 band

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 section 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.7.5.3.1.1-4.

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 i	s 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

Parameter ^{Note 5}	l Init	Unit T1		T2		T3		ĺ
Farameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	ĺ

SSB ARFCN			Freq1	Freq2	Freq1	Freq2	Freq1	Freq2
Duplex mode	Config 1		FDD	TDD	FDD	TDD	FDD	TDD
	Config 2,3			1	TDD)	1	T
TDD configuration	Config 1		Not Applicabl e	TDDConf .3.1	Not Applica ble	TDDCo nf.3.1	Not Applica ble	TDDCo nf.3.1
	Config 2,3		TDDConf .1.1	.0	TDDCo nf.1.1	111.0.1	TDDCo nf.1.1	111.0.1
Initial BWP Configuration	Config 1,2,3				DLBW	P.0		
BWchannel	Config 1,2	MHz	10: N _{RB,c} = 52	100:	10: N _{RB,c} = 52	100:	10: N _{RB,c} = 52	100:
	Config 3		40: N _{RB,c} = 106	N _{RB,c} = 66	40: N _{RB,c} = 106	N _{RB,c} = 66	40: N _{RB,c} = 106	N _{RB,c} = 66
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	-
orial mor	Config 3		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 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		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	
RMC CORESET Parameters	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 Patterns	T			1	OP.			ı
SSB configuration	Config 1,2		SSB.1 FR1	SSB.3	SSB.1 FR1	SSB.3	SSB.1 FR1	SSB.3
	Config 3		SSB.2 FR1	FR2	SSB.2 FR1	FR2	SSB.2 FR1	FR2
SMTC configuration					SMTC	5.1		
EPRE ratio of PSS to EPRE ratio of PBCH EPRE ratio of PBCH	_DMRS to SSS	}						
EPRE ratio of PDCC	1							
EPRE ratio of PDCC	40			^				
EPRE ratio of PDSC	dB			0				
EPRE ratio of PDSC								
EPRE ratio of OCNG EPRE ratio of OCNG	DMRS to SSS ^{Note 1} to OCNG DMRS Note							
\hat{E}_s/N_{oc}		dB	TBD	TBD	TBD	TBD	TBD	TBD
Propagation conditio				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-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

A.7.5.3.2.2 Test Requirements

The test requirements defined in section A.7.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [TBD*T_{SMTC_SCell} +5ms] as defined in section 8.3.

A.7.5.4 UE UL carrier RRC reconfiguration Delay

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz bandwidth
2	TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth
Note: The UE is only r	equired 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

Parameter		Uni	Va	lue	Comment		
		t	Test 1	Test 2			
Active F	PCell		Cell 1	Cell 1			
	nnel Number		1	1			
Duplex	Config 1		TDD	TDD			
mode	Config 2		TDD	TDD			
TDD	Config 1		[TDDConf.3.1]	[TDDConf.3.1]			
Configu ation	r Config 2		[TDDConf.3.1]	[TDDConf.3.1]			
CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]			
ET	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]			
Referen			1				
e Channe							
SSB	Config 1		TBD (Note:	TBD (Note:			
Configu			periodicity is 20ms)	periodicity is 20ms)			
ation	Config 2		TBD (Note:	TBD (Note:			
SMTC	Config 1		periodicity is 20ms) TDD	periodicity is 20ms) TDD			
Configu	Config 1 r Config 2	-	TDD	TDD			
ation	· Coming ∠		טטו	טטו			
PDSCH	/ Config 1		120 KHz	120 KHz			
PDCCH		1	120 KHz	120 KHz			
subcarr	ie -		120 ΝΠΔ	IZU NAZ			
r spacin							
csi-RS-			[0]	[0]			
	d as RLM RS		TDD	TDD			
	NG parameters				rameters TBD TBD Normal Normal		
CP leng	tion Matrix and		[2x2 Low]	[2x2 Low]			
Antenna			[ZXZ LOW]	[ZXZ LOW]			
Configu							
	DCI format		1-0	1-0			
	Number of		2	2			
Beam	Control						
failure	OFDM						
detect	symbols	CC	8	8			
trans	Aggregation level	E	0	O			
missio	Ratio of	dB	0	0			
n	hypothetical	u _D	· ·	Ŭ			
param	PDCCH RE						
eters	energy to						
	average						
	CSI-RS RE						
	energy	٠ID	•	0			
	Ratio of hypothetical	dB	0	0			
	PDCCH						
	DMRS						
	energy to						
	average						
	CSI-RS RE						
	energy						
	DMRS		REG bundle size	REG bundle size			
	precoder						
	granularity REG bundle		6	6			
	size		Ö	Ö			
DRX	3120		OFF	OFF			
Gap par	tern ID		[N.A.]	*[<i>gp0</i>]			
ssb-Ind			2	2	Number of SSB		
					indexes used for		
					beam failure		
					detection		

rlmInSync0 Threshold	OutOfSync		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).								
rsrp-Thresh	noldSSB		-ThresholdSSB		o-ThresholdSSB		ThresholdSSB		hresholdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCont S	rolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS								
beamFailui MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17								
beamFailui Timer	eDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17								
ZP CSI-RS configuatio					TBD	TBD							
CSI-IM con	figuration		TBD	TBD									
Periodic CS	SI reporting		PUCCH	PUCCH									
CSI reporting	Config 1, 2	slot	[5]	[5]									
periodicit y	Config 3		[10]	[10]									
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1								
T2		S	0.4	0.4									
T3		s	[0.6]	[0.6]									
D1		S	[0.24]	[0.44]									
Note 1:	JE-specific I	PDCCH	is not transmitted after	T1 starts.									

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

Parameter		Unit		Test	1 and To	est 2			Test	1 and T	est 2		
			SSB of set q ₀						SSB of set q ₁				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	
PDCCH	_beta	dB			4					4			
PDCCH	_DMRS_bet	dB			4					4			
а													
PBCH_b	eta	dB											
PSS_be	ta	dB											
SSS_be	ta	dB											
PDSCH	_beta	dB											
OCNG_I	oeta	dB	0				0						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	Config 1	dBm/			[-98]			[-98]					
1 oc	Config 2				[-98]			[-98]					
Config 3 Hz [-98]		[-98]											
Propaga condition				[TDL-0	C 300ns 1	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.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 [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 2
rieiu	Value
gapOffset	[0]

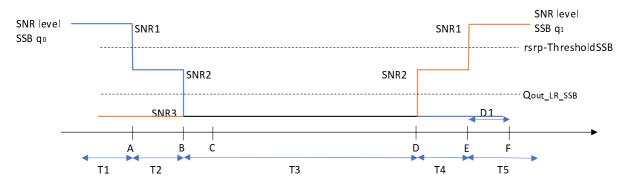


Figure A.7.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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

Editor's note: It is open whether BFD can be based on SSB. This test case will be updated accordingly.

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 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 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

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, 100MHz bandwidth
2		TDD duplex mode, 240 kHz SSB SCS, 100MHz bandwidth
Note:	The UE is only re	equired 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		Uni	Va	Comment		
		t	Test 1	Test 2		
Active F	PCell		Cell 1	Cell 1		
	nnel Number		1	1		
Duplex	Config 1		TDD	TDD		
mode			TDD	TDD		
	TDD Config 1		[TDDConf.3.1]	[TDDConf.3.1]		
Configu ation	r Config 2		[TDDConf.3.1]	[TDDConf.3.1]		
CORES	Config 1		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
ET	Config 2		[CR. 3.1 TDD]	[CR. 3.1 TDD]		
Referen	ic		-	_		
e Channe						
SSB	Config 1		TBD (Note:	TBD (Note:		
Configu			periodicity is 20ms)	periodicity is 20ms)		
ation	Config 2		TBD (Note:	TBD (Note:		
			periodicity is 20ms)	periodicity is 20ms)		
SMTC	Config 1		TDD	TDD		
Configu	r Config 2		TDD	TDD		
ation PDSCH	/ Confic 1		120 KHz	120 KHz		
PDSCH	.					
subcarri			120 KHz	120 KHz		
r spacin	g					
csi-RS-l			[0]	[0]		
	d as RLM RS					
	parameters		TBD	TBD		
CP leng	tion Matrix and		Normal [2x2 Low]	Normal [2x2 Low]		
Antenna			[ZXZ LOW]	[ZXZ LOW]		
Configu						
	DCI format		1-0	1-0		
	Number of		2	2		
Beam	Control					
failure detect	OFDM symbols					
ion	Aggregation	CC	8	8		
trans	level	E	Ü	Ü		
missio	Ratio of	dB	0	0		
n	hypothetical					
param eters	PDCCH RE					
CICIS	energy to average					
	CSI-RS RE					
	energy					
	Ratio of	dB	0	0		
	hypothetical					
	PDCCH DMRS					
	energy to					
	average					
	CSI-RS RE					
	energy					
	DMRS		REG bundle size	REG bundle size		
	precoder					
	granularity REG bundle		6	6		
	size		U			
DRX			640	640		
Gap pat			[N.A.]	*[<i>gp0</i>]		
ssb-Inde	ex		2	2	Number of SSB	
					indexes used for	
					beam failure detection	
L		L		l	GOLOGION	

rlmInSyncOutOfSync Threshold			absent	absent	When the field is absent, the UE applies the value		
					0. (Table 8.1.1-1).		
rsrp-Thresh	noldSSB		TBD	TBD	Threshold used for Qout_LR_SSB		
powerCont S	rolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS		
beamFailur MaxCount	elnstance		[n2]	[n2]	see TS 38.321 [7], section 5.17		
beamFailur Timer	beamFailureDetection Timer		ailureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
	ZP CSI-RS configuation		TBD	TBD			
CSI-IM con	CSI-IM configuration		TBD	TBD			
Periodic CS	SI reporting		PUCCH	PUCCH			
CSI reporting	Config 1, 2	slot	[5]	[5]			
periodicit y	Config 3		[10]	[10]			
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1		
T2	T2		0.4	0.4			
T3		S	[0.6]	[0.6]			
D1		S	[0.24]	[0.44]			
Note 1:	JE-specific F	PDCCH	is not transmitted after	Γ1 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 and To	est 2		Test 1 and Test 2					
			SSB of set q ₀					SSB of set q ₁					
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5	
PDCCH_beta		dB			4					4			
PDCCH	_DMRS_bet	dB			4					4			
а													
PBCH_b	eta	dB											
PSS_bet	ta	dB											
SSS_bet	ta	dB											
PDSCH_	_beta	dB											
OCNG_b	oeta	dB	0				0						
SNR	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
N_{oc}	Config 1	dBm/		[-98]		[-98]							
1 voc	Config 2 15K		[-98]					[-98]					
Config 3 Hz		[-98]					[-98]						
Propagation condition					C 300ns 1				•	C 300ns 1			

- 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.7.5.5.2.1-1.
- 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 [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
rieiu	Value
gapOffset	[0]

Table A.7.5.5.2.1-5: DRX-Configuration for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx- RetransmissionTimerDL	[sl1]	[sl1]
drx- RetransmissionTimerUL	[sl1]	[sl1]
longDRX- CycleStartOffset	[ms640]	[ms40]
shortDRX	disable	disable

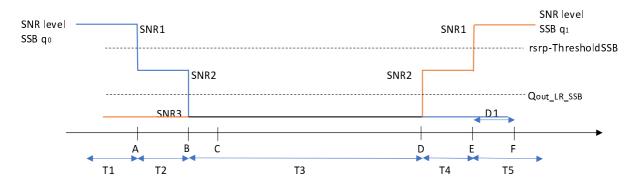


Figure A.7.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.7.5.5.3.1-3, A.7.5.5.3.1-4 and A.7.5.5.3.1-5 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.7.5.5.3.1-1 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 using GP ID #0 (40ms) in test 2.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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		Uni	Va	Comment	
		t	Test 1	Test 2	
Active F	Cell		Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1		TDD	TDD	
TDD Configu	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
ration					
CORES			[CR. 3.1 TDD]	[CR. 3.1 TDD]	A.3.1.2
Reference Channe					
SSB	Config 1		SSB.1 FR2	SSB.1 FR2	A.3.10
Configu ration	9				
SMTC Configu ration	Config 1		SMTC.1	SMTC.1	A.3.11
PDSCH /PDCC H subcarri			120KHz	120KHz	
spacing					
csi-RS-l			[0]	[0]	
failure F	d as beam				
	parameters		TBD	TBD	A.3.2.1
CP leng			Normal	Normal	-
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Antenna					
Configu	DCI format		1-0	1-0	
	Number of		2	2	
Beam failure detect	Control OFDM			_	
ion trans	symbols Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		6	6	
DRX			OFF	OFF	
Gap pat	tern ID		[N.A.]	*[<i>gp0</i>]	

. 50.1			•	•	
csi-RS-In	dex		2	2	Number of SSB
					indexes used for
					beam failure
					detection
	OutOfSync		absent	absent	When the field is
Threshold	t				absent, the UE
					applies the value
					0. (Table 8.1.1-1).
rsrp-Thre	sholdSSB		TBD	TBD	Threshold used
-					for Q _{out_LR_SSB}
powerCor	ntrolOffsetS		NA	NA	Used for deriving
S					rsrp-
					ThresholdCSI-RS
beamFail	ureInstance		[n2]	[n2]	see TS 38.321 [7],
MaxCoun	t				section 5.17
beamFail	beamFailureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7],
Timer			4 1		section 5.17
ZP CSI-R	ZP CSI-RS		TBD	TBD	
configuati	configuation				
	onfiguration		TBD	TBD	
Periodic (CSI reporting		PUCCH	PUCCH	
CSI	Config 1, 2	slot	[5]	[5]	
reportin	Config 3	0.01	[10]	[10]	
g	Corming o		[.0]	[.0]	
periodic					
ity					
T1	I	S	1	1	During this time
			•	·	the the UE shall
					be fully
					synchronized to
					cell 1
T2	T2		0.4	0.4	OCII I
T3		S S	[TBD]	[TBD]	
D1		S	[0,24]	[0.44]	
Note 1:	LIF-specific F		is not transmitted after		L
INOLE I.	OF-Sherille I	50011	is not transmitted after	i i 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 and To	est 2				1 and To		
					-RS of se					RS of se		
			T1	T2	Т3	T4	T5	T1	T2	Т3	T4	T5
	tio of PSS	dB										
to SSS												
	tio of PBCH	dB										
DMRS to		ID.			0					0		
	tio of PBCH	dB			U					U		
to PBCH		40										
EPRE ra		dB										
SSS	DIVIKS 10											
EPRE ra	tio of	dB										
	to PDCCH	ub										
DMRS	01 00011											
EPRE ra	tio of	dB										
PDSCH												
SSS												
EPRE ra	tio of	dB										
	to PDSCH											
DMRS												
	tio of OCNG	dB										
	SSS ^(Note 1)											
	tio of OCNG	dB										
1) to OCNG	DMRS (Note											
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2	uБ	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
31-13												
	Config 3	4D/	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1 Config 2	dBm/ 15K			[-98]					[-98]		
	Config 3	Hz			[-98] [-98]					[-98] [-98]		
SS-	Corning 3	dBm			[-90]					[-90]		
RSRP ^N		/SC										
ote 3		S										
Ê _s /I _{ot}												
Ê _s /N _{oc}												
lo	config 1, 2	dBm/										
	, , , , ,	9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
		MHz										
Propaga				Τ]	DLA30-7	5]			[Τ	DLA30-7	'5]	
condition												
Note 1.		I ha lica	n cuch th	at the rec	COURCES in	1 (CALL 1 A	ra tuilv all	located a	nd a cons	tant total	tranemit	tod

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.5.5.3.1-4: Measurement gap configuration for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 2			
rieid	Value			
gapOffset	[0]			

Table A.7.5.5.3.1-5: NZP-CSI-RS resource configuration for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Field	Resourceld 0	Resourceld 1
	Value	Value
frequencyD omainAlloca tion ^{Note 1}	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 2: nro	38.211 [6] table of t	based on the

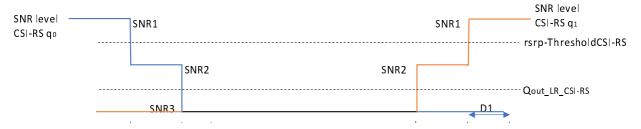


Figure A.7.5.5.3.1-1: SNR variation SSB for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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, A.7.5.5.4.1-4, A.7.5.5.4.1-5 and A.7.5.5.4.1-6 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. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100MHz 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		Uni	Va	lue	Comment
		t	Test 1	Test 2	
Active F			Cell 1	Cell 1	
	nnel Number		1	1	
Duplex mode	Config 1		TDD	TDD	
TDD Configu ration	Config 1		[TDDConf.3.1]	[TDDConf.3.1]	
CORES ET Referen ce Channe			[CR. 3.1 TDD]	[CR. 3.1 TDD]	A.3.1.2
SSB Configu ration			SSB.1 FR2	SSB.1 FR2	A.3.10
SMTC Configu ration			SMTC.1	SMTC.1	A.3.11
PDSCH /PDCC H subcarri er spacing			120 KHz	120 KHz	
csi-RS-I	ndex		[0]	[0]	
	d as RLM RS		TBD	TBD	A.3.2.1
CP leng	parameters th		Normal	Normal	A.3.2.1
	ion Matrix and		[2x2 Low]	[2x2 Low]	
Antenna	l				
Configu					
	DCI format		1-0	1-0	
Beam failure detect	Number of Control OFDM symbols		2	2	
ion trans	Aggregation level	CC E	8	8	
missio n param eters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	0	
	DMRS precoder granularity		REG bundle size	REG bundle size	
	REG bundle size		б	٥	
DRX			640	640	
Gap pat	tern ID		[N.A.]	*[<i>gp0</i>]	

csi-RS-In	dex		2	2	Number of SSB indexes used for beam failure
					detection
rlmInSynd Threshold	cOutOfSync I		absent	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-Thres	sholdSSB		TBD	TBD	Threshold used for Qout_LR_SSB
powerCor S	ntrolOffsetS		NA	NA	Used for deriving rsrp- ThresholdCSI-RS
beamFail MaxCoun	ureInstance t		[n2]	[n2]	see TS 38.321 [7], section 5.17
Timer	ureDetection		[pbfd4]	[pbfd4]	see TS 38.321 [7], section 5.17
ZP CSI-R configuati	on		TBD	TBD	
CSI-IM co	onfiguration		TBD	TBD	
Periodic 0	CSI reporting		PUCCH	PUCCH	
CSI	Config 1, 2	slot	[5]	[5]	
reportin g periodic ity	Config 3		[10]	[10]	
T1		S	1	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.4	0.4	
T3		S	[TBD]	[TBD]	
D1		S	[0.24]	[0.44]	
Note 1:	UE-specific F	PDCCH	is not transmitted 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

, i ai a	meter	Unit	Test 1 and Test 2				Test 1 and Test 2					
					-RS of se					RS of se		
<u> </u>			T1	T2	T3	T4	T5	T1	T2	Т3	T4	T5
EPRE rati	io of PSS	dB										
to SSS	(ID.										
	o of PBCH	dB										
DMRS to	io of PBCH	dB			0					0		
to PBCH I		uБ			U					U		
EPRE rati		dB										
PDCCH D		GD.										
SSS												
EPRE rati	io of	dB										
PDCCH to	PDCCH											
DMRS												
EPRE rati		dB										
PDSCH D	MRS to											
SSS		ID.										
EPRE rati		dB										
DMRS	РРОСП											
	io of OCNG	dB										
	SSS ^(Note 1)	ub										
	io of OCNG	dB										
to OCNG	DMRS (Note											
1)												
SNR_C	Config 1	dB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
SI-RS	Config 2		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Config 3		TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
N_{oc}	Config 1	dBm/			[-98]					[-98]		
<i>OC</i>	Config 2	15K			[-98]					[-98]		
00	Config 3	Hz			[-98]					[-98]		
SS- RSRP ^N		dBm /SC										
ote 3		S										
Ê _s /I _{ot}												
Ês/Noc												
lo	config 1, 2	dBm/										
	<i>,</i>	9.36										
		MHz										
	Config 3,	dBm/										
	4	38.1										
Danie i		MHz			DI A00 =	·C1				DI 400 =	·C1	
Propagati condition	on			[1	DLA30-7	5]			[1	DLA30-7	5]	
Note 1:	OCNG shall	l he used	d such th	at the rec	ources in	Call 1 a	re fully all	located a	nd a cons	tant tota	tranemit	ted

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: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.5.5.4.1-4: Measurement gap configuration for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Test 2		
Field	Value		
gapOffset	[0]		

Table A.7.5.5.4.1-5: NZP-CSI-RS resource configuration for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Field	Resourceld 0	Resourceld 1
	Value	Value
frequencyD omainAlloca tion ^{Note 1}	row1	row2
startingRB	0	0
nrofRBs	Note 2	Note 2
Note 1: TS 38.211 [6] table 7.4.1.5.3-1 Note 2: nrofRBs is derived based on the Configuration in Table A.4.5.1.7.1-1		

Table A.7.5.5.4.1-6: DRX-Configuration for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode.

Field	Test 5	Test 6
Field	Value	Value
drx-onDurationTimer	[ms6]	[ms6]
drx-InactivityTimer	[ms1]	[ms1]
drx-	[sl1]	[sl1]
RetransmissionTimerDL		
drx-	[sl1]	[sl1]
RetransmissionTimerUL		
longDRX-	[ms640]	[ms40]
CycleStartOffset		
shortDRX	disable	disable



Figure A.7.5.5.4.1-1: SNR variation SSB 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 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 = [TBD] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 .

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.7.5.6 Active BWP switch delay

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 section 8.6, and interruption requirement on other active serving cell defined in section 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 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 PCell's slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PCell no later than at slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than 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* 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 PCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the SCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than 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, 100MHz bandwidth, TDD -TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			

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		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 SCell
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 SCC.
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 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		TE	DD	
TDD configuration		TDDC	onf.3.1	
BWchannel		100 MHz:	N _{RB,c} = 66	
Active BWP ID		1, 2	3	
Initial BWP Configuration			2.0.2 ^{Note2}	
Active BWP-1 Configuration		DLBWP.1.1 Note2	-	
Active BWP-2 Configuration		DLBWP.1.3 Note2	-	
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		SMT	ΓC.1	
Correlation Matrix and Antenna		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 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)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Ês/Noc	dB	[17]	[17]	
Propagation Condition		AWGN	AWGN	
Note 1: OCNG shall be used such that bo density is achieved for all OFDMs		ly 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: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2;

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 TS 38.213 [3] section 12

Table A.7.5.6.1.1-4: OTA related test parameters for BWP switching test case

Parai	meter	Unit	Cell 1	Cell 2
Angle of arrival config	Angle of arrival configuration		According to table A.X.X	According to table A.X.X
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc} Note1	NR_TDD_FR2_F	dBm/15kHz	TBD	TBD
	NR_TDD_FR2_G	UDIII/ IOKHZ	עסו	טסו
	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	TBD	TBD
	NR_TDD_FR2_G	dbiii/000	100	155
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/120KH	TBD	
OO NON	NR_TDD_FR2_G	Z Note3	150	150
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			

$\hat{\mathrm{E}}_{\!\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\!\scriptscriptstyle \mathrm{ot}}$		dB	TBD	TBD		
	NR_TDD_FR2_A					
	NR_TDD_FR2_B					
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	TBD	TBD		
10.10.02	NR_TDD_FR2_G	MHz Note4	עפו			
	NR_TDD_FR2_T					
	NR_TDD_FR2_Y]				
Note 1:	Interference from other cells and	noise sources no	ot specified in the tes	t is assumed to be		
	constant over subcarriers and tim	e and shall be m	nodelled as AWGN of	f appropriate power		
	for $N_{_{\mathit{oc}}}$ to be fulfilled.					
Note 2:	SS-RSRP and lo levels have bee	n derived from o	ther parameters for i	nformation		
	purposes. They are not settable parameters themselves.					
Note 3:	· · · · · · · · · · · · · · · · · · ·					
	noise at each receiver antenna port.					
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					

As observed with 0dBi 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 SCell in a slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for SCell in a 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-Switching Delay [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 Section 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 a slot ($i + T_{BWPswitchDelay} + k1$), ($j + T_{BWPswitchDelay} + k1$), 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 section 8.6, and interruption requirement on other active serving cell defined in section 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 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 PCell's slot ($i+T_{BWPswitchDelay}$) as defined in section 8.6 and starts to report valid ACK/NACK for the PCell no later than at slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on PCell's BWP-2 no later than 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* 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 PCell's slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the SCell at latest at slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than 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	PCell: NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode		
	SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
2	PCell: NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
	SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
3	PCell: NR 30 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode		
	SCell: NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			

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		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 SCell
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 SCC.
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 A6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
	Config 2,3		TDD	TOO
TDD configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	TDDConf.3.1
	Config 3		TDDConf.2.1	
BW _{channel}	Config 1,2	MHz	10 MHz: N _{RB,c} = 52	100 MH=: N 66
	Config 3		40 MHz: N _{RB,c} = 106	100 MHz: N _{RB,c} = 66
Active BWP ID	<u> </u>		1, 2	3
Initial BWP Configura	ation		DLBW	P.0.2 ^{Note4}
Active BWP-1 Config			DLBWP.1.1 Note4	-
Active BWP-2 Config	uration		DLBWP.1.3 Note4	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.3.1 TDD
measurement	Config 2	†	SR.1.1 TDD	
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
parameters	Config 3	1 -	CR.2.1 TDD	
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	
OCNG Patterns	Oorning o			 P.1
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2
OOD Configuration	Config 3	 	SSB.2 FR1	
SMTC Configuration	Coming 5			ITC.1
Correlation Matrix an	d Antonna			2 Low
Configuration	a Antenna		1/2	LOW
EPRE ratio of PSS to	SSS			
EPRE ratio of PBCH		1		
EPRE ratio of PBCH		†		
EPRE ratio of PDCC		†		
EPRE ratio of PDCC		1		
EPRE ratio of PDSCI		dB	0	0
EPRE ratio of PDSCI		1 45 1	O	
EPRE ratio of OCNG		1		
1)	DIVITO 10 000(14010			
EPRE ratio of OCNG	to OCNG DMRS	1		
(Note 1)	to corre brinte			
È _s /N _{oc}		dB	[17]	[17]
	Config 1,2	dBm/SCS	[-104]	Defined in Table A.7.5.6.1.1-
$N_{oc}^{ m Note2}$	Config 3	1	[-101]	4
N oc Note2	1 3 -	dBm/15KH	[-104]	Defined in Table A.7.5.6.1.1-
		Z		Defined in Table A.7.5.6.1.1-
$\hat{\mathbf{E}}_{\!\scriptscriptstyle{\mathrm{s}}}/\mathbf{I}_{\!\scriptscriptstyle{\mathrm{ot}}}$		dB	[17]	4
SS-RSRP ^{Note3}	Config 1,2	dBm/SCS	[-87]	Defined in Table A.7.5.6.1.1-
OO-INDINI	Config 3		[-84]	4
SCH_RP Note 3		dBm/15 kHz	[-87]	Defined in Table A.7.5.6.1.1-
Propagation Condition	n		AWGN	AWGN
		cells are fully all	ocated and a constant total tra	

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 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 TS 38.213 [3] section 12.

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.

Table A.7.5.6.1.1-4: OTA related test parameters for BWP switching test case

Para	meter	Unit	Cell 2		
Angle of arrival confi	guration		According to table A.X.X		
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz	TBD		
	NR_TDD_FR2_G	UDIII/ IOKHZ	IBD		
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS	TBD		
	NR_TDD_FR2_G	ubii/SCS	IBD		
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	TBD		
33-K3KF*****	NR_TDD_FR2_G	Note3	IBD		
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
$\hat{\mathbf{E}}_{\!\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\!\scriptscriptstyle \mathrm{ot}}$		dB	TBD		
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	TBD		
10 ***	NR_TDD_FR2_G	MHz Note4	TBD		
	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	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					
Note 4: Equivalen	interference and noise at each receiver antenna port.				

A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for SCell in a slot $(i+T_{BWPswitchDelav}+k1)$.

During T3, the UE shall start to send the ACK for SCell in a 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 Section 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 a 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- 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 section 8.6. 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 bandwidth part configuration BWP-2, 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 at PCell's slot (i+X) as defined in section 8.6 and starts to report valid ACK/NACK for the PCell no later than at slot (i+X+kI). The UE shall be continuously scheduled on PCell's BWP-2 starting from slot (i+X).

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the RRC Reconfiguration message including BWP switch command is received till an ACK 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, 100MHz bandwidth, TDD duplex mode	
2	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required 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 mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial BWP Configuration		DLBWP.0.2
Active BWP-1 Configuration		DLBWP.1.3
Active BWP-2 Configuration		DLBWP.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		TBD
TRS Configuration		TBD
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 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, OCNC shall be used such that both	l Lalla ava fullura	lla anta di anadi a namatant

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 TS 38.213 [3] section 12.

A.7.5.6.2.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PCell in a slot (i+X+k1).

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%.

NOTE: During T1, if there are no uplink resources for reporting the ACK in a slot (i+X+kI), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of X, k1 for type 1 and type 2 UE.

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

Configuration Description			
1		120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
2		240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode	
Note:	The UE is only re	quired 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.7.6.1.1.1-1 and A.7.6.1.1.1-2 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.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.
Gap type		1, 2	n.a.	
Measurement gap repitition periodicity	ms	1, 2	n.a.	
Measurement gap length	ms	1, 2	n.a.	
Measurement gap offset	ms	1, 2	n.a.	
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 EN-DC
Time offset between Cell 2 and Cell 3		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 DLBWP.0		
configuration		ULBWP.0	ULBWP.0	
Active DL BWP	1, 2	DLBWP.1	DLBWP.1	
configuration				
Active UL BWP	1, 2	ULBWP.1	ULBWP.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				
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.7.6.1.1.1-4: 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 2		Cell 3	
			T1	T2	T1	T2
AoA setup		1, 2		A.	3.8.x	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	TBD	TBD	TBD	TBD
Note 2	dBm/15 KHz	1, 2		T	BD	
N_{oc} Note 2	dBm/SCS	1		T	BD	
1 voc		2		T	BD	
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD
		<u>2</u>	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	1, 2	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1, 2	TI	3D	TE	3D

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_{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.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 or 3,
- [1.44s] for a UE supporting power class 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

	Configuration	Description
1		120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired 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	Value		Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Ce	ll 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 a 2	and Cell	One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	n.a.		
Measurement gap repitition periodicity	ms	1, 2	n.a.		
Measurement gap length	ms	1, 2	n.a.		
Measurement gap offset	ms	1, 2	n.a.		
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	ON		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 EN-DC
Time offset between Cell 2 and Cell 3		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	TBD	

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 DLBWP.0		
configuration		ULBWP.0	ULBWP.0	
Active DL BWP	1, 2	DLBWP.1	DLBWP.1	
configuration				
Active UL BWP	1, 2	ULBWP.1	ULBWP.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				
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.7.6.1.2.1-4: 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 2	Cell 3	
			T1	T2	T1	T2
AoA setup		1, 2		A.	3.8.x	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2	TBD	TBD	TBD	TBD
Note 2	dBm/15 KHz	1, 2		T	BD	
N_{oc} Note 2	dBm/SCS	1		T	BD	
1 voc		2	TBD			
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD
		<u>2</u>	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	1, 2	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz 1, 2 TBD TBD					3D
	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.					
	i ney are n	ot settable parameters t	nemseivės.			

Table A.7.6.1.2.1-5: DRX-Configuration for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Field	Value	Value	Comment
rieid	Test1	Test2	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	sf640	
shortDRX	disable	disable	

Table A.7.6.1.2.1-6: *TimeAlignmentTimer* -Configuration for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Field	Value	Value	Comment
rieid	Test1	Test2	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

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 or 3,
- [4.32s] for a UE supporting power class 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 or 3,
- [30.72s] for a UE supporting power class 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

C	Configuration	Description
1		120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired 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 \sim 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 Cell 2	One TDD carrier frequency is used for the 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	
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 EN-DC
Time offset between Cell 2 and Cell 3		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

Parameter	Unit	Config	Ce	Cell 1		II 2	
			T1	T2	T1	T2	
TDD configuration		1, 2	TDDC	onf.3.1	TDDC	onf.3.1	
Intial BWP		1, 2	DLB\	NP.0	DLB\	WP.0	
configuration			ULB\	NP.0	ULB\	WP.0	
Active DL BWP		1, 2	DLB\	NP.1	DLB\	WP.1	
configuration							
Active UL BWP		1, 2	ULB\	NP.1	ULB\	WP.1	
configuration							
RLM-RS		1, 2	CSI	-RS	CSI	-RS	
PDSCH RMC		1, 2	SR.3.	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							
OCNG Patterns		1, 2	OF	OP.1		P.1	
SSB	_	1	SSB.1 FR2 SSB.1 F		1 FR2		
		2	SSB.2 FR2 SSE		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	Cell 2		Cell 3	
			T1	T2	T1	T2

AoA setup		1, 2		Α.:	3.8.x	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2	TBD	TBD	TBD	TBD
N_{oc} Note 2	dBm/15 KHz	1, 2		Т	BD	
Note 2	dBm/SCS	1		Т	BD	
1 voc		2	TBD			
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD
		<u>2</u>	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	1, 2	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1, 2	TE	3D	TE	3D

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 or 3,
- [1.92s] for a UE supporting power class 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

	Configuration	Description
1		120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired 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.7.6.1.4.1-1 and A.7.6.1.4.1-2 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 (C	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.				
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						
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	ON		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		3 μs		3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1, 2	3 μs		Synchronous cells				
T1	S	1, 2	5						
T2	S	1, 2	10	TBD					

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	Ce	II 1	Cell 2	
			T1	T2	T1	T2
TDD configuration		1, 2	TDDC	onf.3.1	TDDC	onf.3.1
Intial BWP		1, 2	DLB\	NP.0	DLB\	WP.0
configuration			ULB\	NP.0	ULB\	WP.0
Active DL BWP		1, 2	DLB\	NP.1	DLB\	WP.1
configuration						
Active UL BWP		1, 2	ULB\	NP.1	ULB	WP.1
configuration						
RLM-RS		1, 2	SS	SB	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						
OCNG Patterns		1, 2	OF	P.1	OF	P.1
SSB		1	SSB.1 FR2 SSB.1 SSB.2 FR2 SSB.2		1 FR2	
		2			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	Ce	II 2	Cell 3		
			T1	T2	T1	T2	

AoA setup		1, 2	A.3.8.x					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	TBD	TBD	TBD	TBD		
N_{oc} Note 2	dBm/15 KHz	1, 2	TBD					
Note 2	dBm/SCS	1 TBD						
1 voc		2		TBD				
SS-RSRP	dBm/SCS	1	TBD	TBD	TBD	TBD		
		<u>2</u>	TBD	TBD	TBD	TBD		
\hat{E}_s/N_{oc}	dB	1, 2	TBD	TBD	TBD	TBD		
Io	dBm/95.04MHz	1, 2	TE	3D	TE	3D		
	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.7.6.1.4.1-5: DRX-Configuration for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Field	Value	Value	Comment
Field	Test1	Test2	
onDurationTimer	psf1	psf1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	psf1	psf1	38.331 [2]
drx-RetransmissionTimer	psf1	psf1	
longDRX-CycleStartOffset	Sf40	TBD	
shortDRX	disable	disable	

Table A.7.6.1.4.1-6: *TimeAlignmentTimer* -Configuration for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Field	Value	Value	Comment
rield	Test1	Test2	
TimeAlignmentTimer	sf500	sf500	As specified in clause 6.3.2 in TS 38.331 [2]

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 or 3,
- TBD for a UE supporting power class 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 or 3,
- [30.72s] for a UE supporting power class 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.

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.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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, 100MHz bandwidth, TDD duplex mode
Note 1:	target NR cell ha	s the same SCS, BW and duplex mode as NR serving cell

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 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	-6		
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
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	s	Config 1	5		
T2	S	Config 1	TBD	TBD	

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	Се	II 1	Cell 1		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	el Number		Config 1	,	1		2	
Duplex mode			Config 1	T	DD	Т	DD	
TDD configura	tion		Config 1		onf.3.1	TDDConf.3.1		
BWchannel		MHz	Config 1		RB,c = 66		RB,c = 66	
BWP BW	T	MHz	Config 1		RB,c = 66		_{RB,c} = 66	
BWP configuration	Initial DL BWP				VP.0.1		I/A	
	Dedicated DL BWP		Config 1	DLBV	VP.1.1	١	I/A	
00110 5 #	Dedicated UL BWP		0 " 1	ULBV	VP.1.1	١	I/A	
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1		P.1	0	P.1	
PDSCH Refere measurement	channel		Config 1	SR.3.	1 TDD		-	
CORESET Ref			Config 1	CR.3.	1 TDD		-	
SMTC configur in A.3.11.1 and			Config 1	SM	TC.1	SM	TC.1	
PDSCH/PDCC spacing	H subcarrier	kHz	Config 1	12	20	1	20	
DMRS EPRE ratio of I to SSS EPRE ratio of I PDCCH DMRS EPRE ratio of I to SSS EPRE ratio of I PDSCH EPRE ratio of 0 to SSS(Note 1) EPRE ratio of 0 OCNG DMRS UE orientation axis and TBD a Relative differen	PBCH DMRS PBCH to PBCH PDCCH DMRS PDCCH to S PDSCH DMRS PDSCH DMRS OCNG DMRS OCNG DMRS OCNG to (Note 1) around TBD axis ence in angle of	degrees	Config 1 Config 1	O NA NA			0 BD TBD	
arrival of cell 3 $\frac{2}{N_{oc}}$ Note2	Telative to cell	dBm/15 kHz Note5		-98		-98		
$N_{oc}^{ m Note2}$		dBm/S CS Note4	Config 1		39		89	
SS-RSRP Note 3		dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82	
\hat{E}_s/I_{ot}		dB	Config 1	4	4	-Infinity	7	
\hat{E}_s/N_{oc}		dB	Config 1	4	4	-Infinity	7	
Io ^{Note3}		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00	
Propagation Co	ondition		Config 1		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
	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.7.6.2.1.2 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 [TBD] 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 [TBD] 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.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.

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.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

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.7.6.2.2.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description				
1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note 1: target NR cell	has the same SCS, BW and duplex mode as NR serving cell				

Table A.7.6.2.2.1-1: 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		1,	2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1	NR cell 1 (Pcell)				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	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	DRX	DRX	DRX	DRX is used
			.1	.2	.1	.2	
Time offset between		Config 1	3µs				Synchronous cells.
serving and neighbour							
cells							
T1	S	Config 1	5			1	
T2	S	Config 1	TBD	TBD	TBD	TBD	

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	Cell 1		Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channel Number			Config 1	•	1		2	
TDD configuration			Config 1	TDDConf.3.1		TDDConf.3.1		
Duplex mode			Config 1	TDD		TDD		
BW _{channel}		MHz	Config 1	100: $N_{RB,c} = 66$		100: N _{RB,c} = 66		
BWP BW		MHz	Config 1		$_{RB,c} = 66$	100: N _{RB,c} = 66		
BWP configuration	Initial DL BWP				VP.0.1	N/A		
	Dedicated DL BWP		Config 1	DLBV	VP.1.1	N	I/A	
	Dedicated UL BWP			ULBV	VP.1.1	١	I/A	
OCNG Patterns A.3.2.1.1 (OP.1)		Config 1		P.1	OP.1		
PDSCH Refere measurement of	hannel		Config 1		1 TDD		-	
CORESET Refe Channel			Config 1	CR.3.	1 TDD	-		
SMTC configuration A.3.11.1 and			Config 1	SM	ΓC.1	SMTC.1		
PDSCH/PDCCl spacing		kHz	Config 1	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 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) UE orientation around TBD axis and TBD axis Relative difference in angle of arrival of cell 3 relative to cell 2 Noc Note2		degrees degrees dBm/15 kHz	Config 1 Config 1 Config 1	N	NA NA		0 BD TBD	
$N_{oc}^{ m Note2}$		Note5 dBm/S CS	Config 1	-89		-	-89	
SS-RSRP Note 3		Note4 dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	4	4	-Infinity	7	
\hat{E}_s/N_{oc}		dB	Config 1	4	4	-Infinity	7	
Io ^{Note3}		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00	
Propagation Co	ndition		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

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 guiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.7.6.2.2.2 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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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, 100MHz bandwidth, TDD duplex mode				
Note 1: t	target NR cell has	s the same SCS, BW and duplex mode as NR serving cell				

Table A.7.6.2.3.1-1: 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 (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	-6			
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	
Time offset between serving and neighbour cells		Config 1	3µs		Synchronous cells.	
T1	S	Config 1	5			
T2	s	Config 1	TBD	TBD		

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	Cell 1		Cell 2	
		configuratio n	T1	T2	T1	T2
NR RF Channel Number		Config 1	•	1		2
Duplex mode		Config 1	TDD		TDD	
TDD configuration		Config 1	TDDConf.3.1		TDDConf.3.1	
BW _{channel}	MHz MHz	Config 1	100: N _{RB,c} = 66 100: N _{RB,c} = 66		100: N _{RB,c} = 66	
BWP BW Initial DL	IVITZ	Config 1	DLBW		100: N _{RB,c} = 66 N/A	
configuration BWP			DLDV	71 .0.1	'	4// (
Dedicated DL BWP		Config 1	DLBW	/P.1.1	1	N/A
Dedicated UL BWP			ULBW	/P.1.1	N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1	OF	P.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	SM	ΓC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	12	20	120	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS			0		0	
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1				
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)						
UE orientation around TBD axis and TBD axis	degrees	Config 1	NA		TBD	
Relative difference in angle of arrival of cell 3 relative to cell 2	degrees	Config 1	NA		NA	TBD
N_{oc} Note2	dBm/15 kHz Note5		-98		-98	
N_{oc} Note2	dBm/S CS Note4	Config 1	-89		-89	
SS-RSRP Note 3	dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82
\hat{E}_{s}/I_{ot}	dB	Config 1	4	4	-Infinity	7
\hat{E}_s/N_{oc}	dB	Config 1	4	4	-Infinity	7
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00
Propagation Condition	140160	Config 1		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
	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.7.6.2.3.2 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 [TBD] 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 [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

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.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note 1: target NR cell	has the same SCS, BW and duplex mode as NR serving cell

Table A.7.6.2.4.1-1: 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	1, 2		1, 2			Two FR1 NR carrier frequencies is used.		
Active cell		Config 1	NR cell 1 (Pcell)		NR cell 1 (Pcell)		NR cell 1 (Pcell)			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 DRX DRX DRX .1 .2 .1 .2			DRX is used				
Time offset between serving and neighbour cells		Config 1	3μs			Synchronous cells.				
T1	S	Config 1	5							
T2	S	Config 1	TBD	TBD	TBD	TBD				

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	Unit Test		II 1	Cell 2		
NR RF Channel Number			configuratio	T1	T2	T1	T2	
			n Config 1		<u> </u> 1		2	
Duplex mode	51 140111501		Config 1	TDD		TDD		
TDD configura	tion		Config 1		onf.3.1		Conf.3.1	
BW _{channel}	11011	MHz	Config 1		RB,c = 66		RB,c = 66	
BWP BW		MHz	Config 1		RB,c = 66		RB,c = 66	
BWP configuration	Initial DL BWP				VP.0.1		I/A	
	Dedicated DL BWP		Config 1	DLBV	VP.1.1	N	I/A	
2212	Dedicated UL BWP			ULBV	VP.1.1	٨	I/A	
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1		P.1	0	P.1	
PDSCH Refere measurement	channel		Config 1		1 TDD		-	
CORESET Ref Channel			Config 1	CR.3.	1 TDD		-	
SMTC configur in A.3.11.1 and			Config 1	SM	ΓC.1	SM	TC.1	
PDSCH/PDCC spacing		kHz	Config 1	1:	20	1	20	
DMRS EPRE ratio of I to SSS EPRE ratio of I PDCCH DMRS	PBCH DMRS PBCH to PBCH PDCCH DMRS PDCCH to		Config 1	0		0		
EPRE ratio of I PDSCH EPRE ratio of 0 to SSS(Note 1) EPRE ratio of 0 OCNG DMRS	OCNG DMRS) OCNG to							
UE orientation axis and TBD a	around TBD	degrees	Config 1	N	IA	TBD		
	ence in angle of	degrees	Config 1		IA	NA	TBD	
$N_{oc}^{ m Note2}$		dBm/15 kHz Note5			-98		-98	
$N_{oc}^{ m Note2}$		dBm/S CS Note4	Config 1	-89			89	
SS-RSRP Note 3		dBm/S CS Note5	Config 1	-85	-85	-Infinity	-82	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	4	4	-Infinity	7	
\hat{E}_s/N_{oc}		dB	Config 1	4	4	-Infinity	7	
Io ^{Note3}		dBm/95 .04 MHz Note5	Config 1	-57.55	-57.55	-Infinity	-56.00	
Propagation Co	ondition		Config 1		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 guiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.7.6.2.4.2 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 [TBD] 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 [TBD] 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 [TBD] 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 [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

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, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz						
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex						
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	mode						
Note: The UE	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 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 on NR RF Channel 1		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
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	TBD		
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	TBD	TBD	

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		Cell	1	Cell 2		
			configuratio n	T1	T1 T2		T2	
NR RF Channe	NR RF Channel Number		Config 1,2,3	1			2	
Duplex mode			Config 1	FD	D	-	ΓDD	
·			Config 2,3	TD	D		ΓDD	
TDD configura	tion		Config 1	Not App			Conf.3.1	
			Config 2	TDDCo			Conf.3.1	
BW _{channel}		MHz	Config 3 Config 1	TDDCo 10: N _{RB}			$\frac{\text{Conf.3.1}}{\text{N}_{\text{RB,c}} = 66}$	
DVV channel		IVII IZ	Config 2	10: N _{RB}			$N_{RB,c} = 66$	
			Config 3	40: N _{RB,0}			$N_{RB,c} = 66$	
BWP BW		MHz	Config 1	10: N _{RB}		100:1	N _{RB,c} = 66	
			Config 2	10: N _{RB}		100: 1	N _{RB,c} = 66	
	1		Config 3	40: N _{RB,0}			$N_{RB,c} = 66$	
BWP configuration	Initial DL BWP			DLBW	P.0.1		N/A	
oorguraor.	Dedicated DL BWP		Config 1,2,3	DLBW	P.1.1		N/A	
	Dedicated UL		<u> </u>	ULBW	P.1.1		N/A	
OCNO Datta	BWP		Confic 1 0 0	J_D.V				
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP	.1)P.1	
PDSCH Refere	ence		Config 1	SR.1.1			-	
measurement	channel		Config 2	SR.1.1				
			Config 3	SR2.1				
CORESET Re	ference		Config 1	CR.1.1		_	-	
Channel			Config 2	CR.1.1		4		
SMTC configuration defined			Config 3 Config 1	CR2.1 SMT		SN	 ЛТС.2	
in A.S. II. I and	in A.3.11.1 and A.3.11.2			SMT	C 1	21	//TC.1	
			Config 2,3					
PDSCH/PDCCH subcarrier spacing		kHz	Config 1,2	15 30			120 120	
EPRE ratio of	PSS to SSS		Config 3	30)		120	
EPRE ratio of								
to SSS	I BCIT DIVING							
	PBCH to PBCH							
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								
EPRE ratio of			1					
OCNG DMRS								
UE orientation axis and TBD a		degrees	Config 1,2,3	NA			ΓBD	
	tive difference in angle of Config 1,2,3 NA		1	NA	TBD			
arrival of cell 3		degrees		1417				
N Note?		dBm/15 NA		4	-	<u>I</u> ГВD		
$N_{oc}^{ m Note2}$		kHz		147	•		. 50	
		Note5	Confin 4.0	k 1 /			NΙΔ	
$N_{oc}^{ m Note2}$		dBm/S CS	Config 1,2 Config 3	N/ N/			NA NA	
		Note4	· ·					
SS-RSRP Note 3	3		Config 1,2	NA	NA	TBD	TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	NA	NA	TBD	TBD	
\hat{E}_s/N_{oc}	dB	Config 1,2,3	NA	NA	TBD	TBD	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	NA	NA	-	-	
	dBm/38 .16MHz	Config 3	NA	NA	-	-	
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD	
Propagation Condition		Config 1,2,3	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.7.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

Supported test configurations are shown in table A.7.6.2.6.1-1.

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.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of target cell							
1	NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz						
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex						
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	mode						
Note: The U	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 Number		Config 1,2,3		1,	2		Two 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	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 on NR RF Channel 1		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
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	TBD				
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	DRX is 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	Зµѕ				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	TBD		TBD		
		. , , , ,					

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		Cell	1	Cell 2		
			configuratio n	T1	T1 T2		T2	
NR RF Channe	NR RF Channel Number		Config 1,2,3	1			2	
Duplex mode			Config 1	FDI)	TDD		
			Config 2,3	TDI)		DD	
TDD configura	tion		Config 1	Not Appl			Conf.3.1	
			Config 2	TDDCo			Conf.3.1	
BW _{channel}		MHz	Config 3 Config 1	TDDCoi 10: N _{RB} ,			$\frac{\text{Conf.3.1}}{\text{N}_{\text{RB,c}} = 66}$	
DVV channel		IVII IZ	Config 2	10: NRB,			$N_{RB,c} = 66$ $N_{RB,c} = 66$	
			Config 3	40: N _{RB,c}			$I_{RB,c} = 66$	
BWP BW		MHz	Config 1	10: N _{RB} ,		100: N	√RB,c = 66	
			Config 2	10: N _{RB} ,		100: N	N _{RB,c} = 66	
	T		Config 3	40: N _{RB,c}			NRB,c = 66	
BWP configuration	Initial DL BWP			DLBW	P.0.1		N/A	
· ·	Dedicated DL BWP		Config 1,2,3	DLBW	P.1.1		N/A	
	Dedicated UL BWP		<u> </u>	ULBWI	P.1.1	ı	N/A	
OCNG Pattern A.3.2.1.1 (OP.	s defined in		Config 1,2,3	OP.	1)P.1	
PDSCH Refere			Config 1	SR.1.1			-	
measurement	channel		Config 2	SR.1.1		1		
			Config 3	SR2.1		1		
CORESET Re	ference		Config 1	CR.1.1			-	
Channel			Config 2	CR.1.1				
			Config 3	CR2.1	TDD			
	SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.2		SMTC.2		
			Config 2,3	SMT	C.1	SN	ITC.1	
PDSCH/PDCCH subcarrier		kHz	Config 1,2	15		120		
spacing			Config 3	30			120	
EPRE ratio of								
EPRE ratio of I to SSS								
DMRS	PBCH to PBCH							
EPRE ratio of I to SSS	PDCCH DMRS							
EPRE ratio of PDCCH DMRS			Config 1,2,3	0			0	
	PDSCH DMRS							
EPRE ratio of I	PDSCH to							
EPRE ratio of								
to SSS(Note 1)								
	G DMRS (Note 1)							
UE orientation axis and TBD a	around TBD	degrees	Config 1,2,3	NA		٦	BD	
Relative difference arrival of cell 3	ence in angle of	degrees	Config 1,2,3	NA		NA	TBD	
N_{oc} Note2		dBm/15 kHz		NA		7	BD	
		Note5						
N_{oc} Note2		dBm/S	Config 1,2	NA	\	-	BD	
1 V oc		CS Note4	Config 3	NA			TBD	
SS-RSRP Note 3	J	1,0101	Config 1,2	NA	NA	TBD	TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	NA	NA	TBD	TBD	
\hat{E}_s/N_{oc}	dB	Config 1,2,3	NA	NA	TBD	TBD	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	NA	NA	-	-	
	dBm/38 .16MHz	Config 3	NA	NA	ı	-	
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD	
Propagation Condition		Config 1,2,3	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.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.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.

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.7.6.2.7.1-1, A.7.6.2.7.1-2, and

A.7.6.2.7.1-3. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

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, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz						
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex						
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	mode						
Note: The UE	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	Va	lue	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 (Pcell)		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 on NR RF Channel 1		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
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	TBD		
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	TBD	TBD	

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

Parameter		Unit Test		Cell	1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	el Number		Config 1,2,3	1			2	
Duplex mode			Config 1	FD	FDD		DD	
·			Config 2,3	TDD			DD	
TDD configura	tion		Config 1	Not App			Conf.3.1	
			Config 2	TDDCo			Conf.3.1	
BW _{channel}		MHz	Config 3 Config 1	TDDCo 10: N _{RB} ,			$\frac{\text{Conf.3.1}}{\text{N}_{\text{RB,c}} = 66}$	
DVV channel		IVII IZ	Config 2	10: N _{RB} ,			$N_{RB,c} = 66$	
			Config 3	40: N _{RB,0}			$N_{RB,c} = 66$	
BWP BW		MHz	Config 1	10: N _{RB} ,		100: 1	N _{RB,c} = 66	
			Config 2	10: N _{RB} ,		100: N	N _{RB,c} = 66	
	T		Config 3	40: N _{RB,c}			N _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBW	P.0.1		N/A	
3	Dedicated DL BWP.1.		P.1.1		N/A			
	Dedicated UL BWP		<u> </u>	ULBWP.1.1			N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.	.1)P.1	
PDSCH Refere			Config 1	SR.1.1	FDD		-	
measurement	channel		Config 2	SR.1.1	TDD			
			Config 3	SR2.1		1		
CORESET Re	ference		Config 1	CR.1.1 FDD			-	
Channel			Config 2	CR.1.1]		
			Config 3	CR2.1	TDD			
SMTC configuration A.3.11.1 and			Config 1	SMT	C.2	SN	ITC.2	
			Config 2,3	SMT	C.1	SN	ITC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15		120		
spacing	2001 200		Config 3	30)		120	
EPRE ratio of								
EPRE ratio of to SSS								
DMRS	PBCH to PBCH							
to SSS	PDCCH DMRS							
EPRE ratio of PDCCH DMRS			Config 1,2,3	0			0	
	PDSCH DMRS							
EPRE ratio of	PDSCH to							
PDSCH EPRE ratio of								
to SSS(Note 1								
	NG DMRS (Note 1)							
UE orientation axis and TBD a	around TBD	degrees	Config 1,2,3	NA			TBD	
Relative differe	ence in angle of	dores	Config 1,2,3	NA		NA	TBD	
arrival of cell 3	relative to cell	degrees						
N_{oc} Note2		dBm/15 kHz		N.A	A	NA NA		
		Note5						
$N_{oc}^{$		dBm/S	Config 1,2	N/			NA	
		CS Note4	Config 3	N.A	\		NA	
SS-RSRP Note 3			Config 1,2	NA	NA	TBD	TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	NA	NA	TBD	TBD
\hat{E}_s/N_{oc}	dB	Config 1,2,3	NA	NA	TBD	TBD
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	ı	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		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 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.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.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. The TCI status for cell2 is defined in table [TBD] and TRS configuration for cell2 is defined in table [TBD].

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.

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.

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, 10MHz bandwidth, FDD duplex mode	120 kHz SSB SCS, 100MHz
2	NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode	bandwidth, TDD duplex
3	NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode	mode
Note: The UE	is only required to be tested in one of the supported test configuration	าร

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	NR cell 1 (Pcell)				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 on NR RF Channel 1		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
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	TBD				
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	DRX is 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	TBD		TBD		

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		Cell	1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	el Number		Config 1,2,3	1			2	
Duplex mode			Config 1	FD	FDD		DD	
·			Config 2,3	TDD			DD	
TDD configura	tion		Config 1	Not App			Conf.3.1	
			Config 2	TDDCo			Conf.3.1	
BW _{channel}		MHz	Config 3 Config 1	TDDCo 10: N _{RB} ,			$\frac{\text{Conf.3.1}}{\text{N}_{\text{RB,c}} = 66}$	
DVV channel		IVII IZ	Config 2	10: N _{RB} ,			$N_{RB,c} = 66$	
			Config 3	40: N _{RB,0}			$N_{RB,c} = 66$	
BWP BW		MHz	Config 1	10: N _{RB} ,		100: 1	N _{RB,c} = 66	
			Config 2	10: N _{RB} ,		100: N	N _{RB,c} = 66	
	T		Config 3	40: N _{RB,c}			N _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBW	P.0.1		N/A	
3	Dedicated DL BWP.1.		P.1.1		N/A			
	Dedicated UL BWP		<u> </u>	ULBWP.1.1			N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.	.1)P.1	
PDSCH Refere			Config 1	SR.1.1	FDD		-	
measurement	channel		Config 2	SR.1.1	TDD			
			Config 3	SR2.1		1		
CORESET Re	ference		Config 1	CR.1.1 FDD			-	
Channel			Config 2	CR.1.1]		
			Config 3	CR2.1	TDD			
SMTC configuration A.3.11.1 and			Config 1	SMT	C.2	SN	ITC.2	
			Config 2,3	SMT	C.1	SN	ITC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15		120		
spacing	2001 200		Config 3	30)		120	
EPRE ratio of								
EPRE ratio of to SSS								
DMRS	PBCH to PBCH							
to SSS	PDCCH DMRS							
EPRE ratio of PDCCH DMRS			Config 1,2,3	0			0	
	PDSCH DMRS							
EPRE ratio of	PDSCH to							
PDSCH EPRE ratio of								
to SSS(Note 1								
	NG DMRS (Note 1)							
UE orientation axis and TBD a	around TBD	degrees	Config 1,2,3	NA			TBD	
Relative differe	ence in angle of	dores	Config 1,2,3	NA		NA	TBD	
arrival of cell 3	relative to cell	degrees						
N_{oc} Note2		dBm/15 kHz		N.A	A	NA NA		
		Note5						
$N_{oc}^{$		dBm/S	Config 1,2	N/			NA	
		CS Note4	Config 3	N.A	\		NA	
SS-RSRP Note 3			Config 1,2	NA	NA	TBD	TBD	

	dBm/S CS Note5	Config 3	NA	NA	TBD	TBD
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	NA	NA	TBD	TBD
\hat{E}_s/N_{oc}	dB	Config 1,2,3	NA	NA	TBD	TBD
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	NA	NA	-	-
	dBm/38 .16MHz	Config 3	NA	NA	-	-
	dBm/95 .04 MHz Note5	Config 1,2,3	-	-	TBD	TBD
Propagation Condition		Config 1,2,3		. 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 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.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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 A4 triggered measurement report, with a measurement reporting delay less than [TBD] 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.7.7 Measurement Performance requirements

A.7.7.1 SS-RSRP

A.7.7.1.1 intra-frequency case

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 Sections 10.1.2.1.1 and 10.1.2.1.1 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 [TBD] and TRS configuration for Cell 1 is defined in Table [TBD].

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
Parameter		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN		freq1 freq1 freq			q1		
Duplex mode		TDD TDD TDD			DD		
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}	MHz	100: N _F	RB,C = 66	100: N _F	RB,C = 66	100: N _F	RB,C = 66
Downlink initial BWP configuration		DLBWP.0					
Downlink dedicated BWP configuration				DLB\	WP.1		
Uplink dedicated BWP configuration				ULB\			
DRX Cycle	ms			Not Ap	plicable		
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Control channel RMC		CCR.3. 1 TDD	-	CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
SMTC configuration		SMTC. 1	SMTC. 1	SMTC. 1	SMTC. 1	SMTC.	SMTC. 1
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 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	0	0
EPRE ratio of OCNG to OCNG DMRS Note							
\hat{E}_s/N_{oc}	dB	6	1	6	1	3	-1
Propagation conditions				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: 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.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

	arameter	Unit	Tes	st 1	Tes	st 2	Tes	st 3
P	arameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	According to section TBD	Cell 2
Angle of arrival or	onfiguration		According to		According to		According to	
Angle of anival of	ngle of arrival configuration		section TBD		sectio	n TBD	section	n TBD
	NR_TDD_FR2_A						TE	BD.
	NR_TDD_FR2_B						TBD	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz ^N	TBD		TBD		TBD	
oc .	NR_TDD_FR2_G	ote4					TBD	
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TBD	
	NR_TDD_FR2_A	NR_TDD_FR2_A					TE	BD.
	NR_TDD_FR2_B						TBD	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCSNote) D		nD	TE	BD
	NR_TDD_FR2_G	3		3D		3D	TE	BD
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TE	BD

	NR_TDD_FR2_A						TBD	TBD
	NR_TDD_FR2_B		TBD				TBD	TBD
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS		TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_G	Note4		100			TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TE	3D
	NR_TDD_FR2_B						TBD	
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04		TBD		TBD		3D
10	NR_TDD_FR2_G	MHz Note4	''			טכ	TE	3D
	NR_TDD_FR2_T						TBD	
	NR_TDD_FR2_Y						TBD	

- 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.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in sections 10.1.3.1.1 and relative accuracy requirements in section 10.1.3.1.2.

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 Sections 10.1.5.1.1 and 10.1.5.1.2 for intra 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						
1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode						
2	240 kHz SSB SCS, 100MHz 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 intra 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. The TCI status for Cell 1 is defined in Table [TBD] and TRS configuration for Cell 1 is defined in Table [TBD].

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Tes	Test 1		st 2
Parameter	Coming	Offic	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN	1~2		freq1	freq2	freq1	freq2	
BW _{channel}	1~2			00: = 66		00: = 66	
Duplex mode	1~2		TDD	TDD	TDD	TDD	
TDD configuration	1~2		TDDConf.3.1		TDDC	onf.3.1	
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			1 FR2		1 FR2	
	2			2 FR2	SSB.2 FR2		
OCNG Patterns DL BWP	1~2		OF DI DIA		OP.1		
UL BWP	1~2 1~2			/P.1.1 /P.1.1	DLBWP.1.1 ULBWP.1.1		
SMTC configuration	1~2		SMT	TC.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 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	1~2	dB	0	0	0	0	
Propagation condition	1~2	-	AW	'GN	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.

Table A.7.7.1.2.2-2: SS-RSRP inter-frequency OTA test parameters

В	arameter	Config	Unit	Tes	t 1	Tes	t 2		
	arameter	Config	Onit	Cell 1	Cell 2	Cell 1	Cell 2		
	NR_TDD_FR2_A						TBD		
	NR_TDD_FR2_B					TBD			
N_{oc}	NR_TDD_FR2_F	4.0	dBm/15	то	D	TDD	TBD		
	NR_TDD_FR2_G	1~2	kHz	kHz TBD	טי	TBD	TBD		
	NR_TDD_FR2_T						TBD		
	NR_TDD_FR2_Y						TBD		
	NR_TDD_FR2_A			TDD		TBD	TBD		
	NR_TDD_FR2_B						TBD		
	NR_TDD_FR2_F	1					TBD		
	NR_TDD_FR2_G	l l	1 TBD TBD	טפו	TBD				
	NR_TDD_FR2_T				TBD				
M	NR_TDD_FR2_Y		dBm/SS				TBD		
N_{oc}	NR_TDD_FR2_A		B SCS				TBD		
	NR_TDD_FR2_B						TBD		
	NR_TDD_FR2_F	2			D	TDD	TBD		
	NR_TDD_FR2_G		TBD TBD	TBD	IBD	IRD		ושט	TBD
	NR_TDD_FR2_T							TBD	
	NR_TDD_FR2_Y						TBD		

	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TBD
	NR_TDD_FR2_B						TBD
	NR_TDD_FR2_F	4			ND.	TDD	TBD
	NR_TDD_FR2_G	I		TE	טפ	TBD	TBD
	NR_TDD_FR2_T						TBD
SS-	NR_TDD_FR2_Y		dBm/SC				TBD
RSRPNote1	NR_TDD_FR2_A		S				TBD
	NR_TDD_FR2_B					TBD -	TBD
	NR_TDD_FR2_F	2		TD) D		TBD
	NR_TDD_FR2_G	2		TE	טפ		TBD
	NR_TDD_FR2_T					TBD	
	NR_TDD_FR2_Y						TBD
	NR_TDD_FR2_A					TBI	D
	NR_TDD_FR2_B		dBm/	TBD		D	
Io ^{Note1}	NR_TDD_FR2_F	1~2	95.04M	TE	אַר	TBI	D
10	NR_TDD_FR2_G	1~2	Hz	IL	,0	TBI	D
	NR_TDD_FR2_T		112	dB TBD TBD		TBI	D
	NR_TDD_FR2_Y					TBI	D
l l	\hat{E}_s/N_{oc}	1~2	dB			TBD	TBD

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.

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the Abosute requirements in sections 10.1.5.1.1 and Relative requirements in section 10.1.5.1.2.

A.7.7.2 SS-RSRQ

A.7.7.2.1 Intra-frequency case

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, 100MHz bandwidth, TDD duplex mode

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter	Unit	Tes	st 1	Tes	st 2	Tes	st 3
	Oilit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Freq2		Freq2 Freq2		Fre	eq2	

Duplex mode		T	DD	TE	DD	TE	DD
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BWchannel	MHz	100: N _F	RB,c = 66	100: N _F	$_{RB,c} = 66$	100: N _R	$_{B,c} = 66$
PDSCH Reference measurement channel		SR.3.1 TDD		SR.3.1 TDD		SR.3.1 TDD	
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	
Dedicated RMSI CORESET Reference Channel		CCR.3 .1 TDD	-	CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration			•	SM	TC.1	•	
SCP configuration		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1
SSB configuration		FR2	FR2	FR2	FR2	FR2	FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
SS-RSSI-Measurement				Not Ap	plicable		
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	иь	U	U	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	3	3	-2.9	-2.9	-4	-4

- 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.

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

Doro	m a 1 a #	Unit	Tes	st 1	Tes	st 2	Test 3			
Fara	meter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2		
Angle of arrival config	nuration			ding to	According to		According to			
Angle of anival coning	guration		section	A.3.8.X	section A.3.8.X		section A.3.8.X			
	NR_TDD_FR2_A						TBD			
	NR_TDD_FR2_B							BD .		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz ^N	т	3D		3D	TE	BD .		
	NR_TDD_FR2_G	ote4	1.	טט	1.5	טט	TE	3D		
	NR_TDD_FR2_T						TE	3D		
	NR_TDD_FR2_Y						TBD			
	NR_TDD_FR2_A							3D		
	NR_TDD_FR2_B						TE	3D		
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	TBD		TBD		TBD			
	NR_TDD_FR2_G	3 100 100		160		100		TE	3D	
	NR_TDD_FR2_T								TE	3D
	NR_TDD_FR2_Y				TBD					
	NR_TDD_FR2_A					TBD	TBD	TBD		
	NR_TDD_FR2_B						TBD	TBD		
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	TBD	TBD	TBD		TBD	TBD		
33-K3KF****	NR_TDD_FR2_G	Note4	טסו	עסו	עסו	טסו	TBD	TBD		
	NR_TDD_FR2_T						TBD	TBD		
	NR_TDD_FR2_Y						TBD	TBD		
	NR_TDD_FR2_A					TBD	TBD	TBD		
SS-RSRQ Note2	NR_TDD_FR2_B	dB	TBD	TBD	TBD		TBD	TBD		
	NR_TDD_FR2_F						TBD	TBD		

	NR_TDD_FR2_G						TBD	TBD
	NR_TDD_FR2_T						TBD	TBD
	NR_TDD_FR2_Y						TBD	TBD
\hat{E}_{s}/I_{ot}		dB	TBD	TBD	TBD	TBD	TBD	TBD
	NR_TDD_FR2_A						TBD	
	NR_TDD_FR2_B						TBD	
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04	TBD		TBD		TBD	
10	NR_TDD_FR2_G	MHz Note4			עפו עפו		עפו	
	NR_TDD_FR2_T						TBD	
	NR TDD FR2 Y						TBD	

- 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 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the guiet zone
- Note 6: NR operating band groups are as defined in Section 3.5.2.

A.7.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 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 alnd 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.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.5.7.2.2-2: SS-RSRQ Inter frequency general test parameters

Parameter	Unit	Tes	st 1	Test 2		Test 3	
Faranietei		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TE	DD	TDD		TDD	
TDD configuration		TDDC	onf.3.1	TDDConf.3.1		TDDC	onf.3.1
BW _{channel}	MHz	100: N _F	RB,c = 66	100: N	RB,c = 66	100: N _F	$_{B,c} = 66$
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 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 SSS ^{Note 1}							
\hat{E}_s/N_{oc}	dD.	TDD	TDD	TDD	TDD	TDD	TDD
\vec{E}_s/N_{oc}	dB	TBD	TBD	TBD	TBD	TBD	TBD

- 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.

Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter		l locit	Tes	st 1	Tes	st 2	Test 3	
		Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
UE orientation aroun axis	UE orientation around TBD axis and TBD axis		TE	3D	TE	3D	TE	BD.
Relative difference in cell 2 relative to cell		degrees	NA	TBD	NA	0	NA	0
$N_{oc}^{}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B		кHz ^N ТВD		TBD		TE TE TE TE TE TE	BD BD BD
$N_{oc}^{ m Note1}$	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 ^{Note}	TBD		TBD		TE TE TE TE	BD BD BD
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/SCS Note4	TBD	TBD	TBD	TBD	TBD TBD TBD TBD TBD TBD TBD	TBD TBD TBD TBD TBD TBD TBD
SS-RSRQ ^{Note2}	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F	dB	TBD	TBD	TBD	TBD	TBD TBD TBD	TBD TBD TBD

	NR_TDD_FR2_G						TBD	TBD		
	NR_TDD_FR2_T						TBD	TBD		
	NR_TDD_FR2_Y						TBD	TBD		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	TBD	TBD	TBD	TBD	TBD	TBD		
	NR_TDD_FR2_A			•		•	TE	3D		
	NR_TDD_FR2_B		TBD		TBD		TE	3D		
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04					TBD			
10	NR_TDD_FR2_G	MHz Note4			ופו ויסו		IBD		TE	3D
	NR_TDD_FR2_T								TE	3D
	NR TDD FR2 Y						TE	3D		

- 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 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the guiet zone
- Note 6: NR operating band groups are as defined in Section 3.5.2.

A.7.7.2.2.3 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.7.7.3 SS-SINR

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 Sections 9.5.2 and section 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 TBD.

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, 100MHz bandwidth, TDD duplex mode				
2	LTE FDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

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.

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. The TCI status for Cell 2 is defined in Table [TBD] and TRS configuration for Cell 2 is defined in Table [TBD].

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
CCP configuration	1		SSB.1 FR2	SSB.1 FR2
SSB configuration	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
DL BWP	1~2		DLBWP.1.1	DLBWP.1.1
UL BWP	1~2		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~2		SMTC.1	SMTC.1
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		TBD	TBD
Propagation condition	1~2		AWGN	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	0
EPRE ratio of PDSCH to PDSCH	1~2	uD.		
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.

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

	Parameter	Config	Unit	Test 1	Test 2
	NR_TDD_FR2_A				TBD
N	NR_TDD_FR2_B				TBD
N_{oc}	NR_TDD_FR2_F	1~2	dBm/15kHz	TBD	TBD
Note1	NR_TDD_FR2_G	1~2	UDIII/ IOKI IZ	100	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B		dD as /CCD		TBD
	NR_TDD_FR2_F	1		TBD	TBD
	NR_TDD_FR2_G	ľ		100	TBD
	NR_TDD_FR2_T				TBD
N_{oc}	NR_TDD_FR2_Y		dBm/SSB SCS		TBD
Note1	NR_TDD_FR2_A		303		TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	2		TBD	TBD
	NR_TDD_FR2_G			טטו	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD

$\hat{\mathbf{E}}_{\scriptscriptstyle{\mathrm{s}}}/\mathbf{I}_{\scriptscriptstyle{\mathrm{ot}}}$		1~2	dB	TBD	TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	1		TBD	TBD
	NR_TDD_FR2_G	ľ		100	TBD
CCD	NR_TDD_FR2_T				TBD
SSB RSRP	NR_TDD_FR2_Y		dBm/SSB		TBD
Note1	NR_TDD_FR2_A		SCS		TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	2		TBD	TBD
	NR_TDD_FR2_G	2			TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A			TBD	TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	1			TBD
	NR_TDD_FR2_G	'			TBD
	NR_TDD_FR2_T		dBm/95.04M		TBD
lo Note1	NR_TDD_FR2_Y		Hz		TBD
10	NR_TDD_FR2_A		112		TBD
	NR_TDD_FR2_B				TBD
	NR_TDD_FR2_F	2		TBD	TBD
	NR_TDD_FR2_G	2		100	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
\hat{E}_s/N_{od}	;	1~2	dB	TBD	TBD

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.

A.7.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 1 shall fulfil the requirements in sections 10.1.20.1.

Editor's Note: which reports are used to verify the accuracy is FFS

A.7.7.4.2 CSI-RS based L1-RSRP measurement

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 Sections 9.5.3 and section 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 TBD.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

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 L1-RSRP measurement based on the CSI-RS resources 0 and 1. 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. Repetition is configured as TBD for the CSI-RS resource set. The TCI status for Cell 2 is defined in Table [TBD] and TRS configuration for Cell 2 is defined in Table [TBD].

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
DL BWP	1		DLBWP.1.1	DLBWP.1.1
UL BWP	1		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS 0	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
CSI-RS 1	1		CSI-RS.3.3 TDD	CSI-RS.3.3 TDD
Number of reported RS	1		2	2
Propagation condition	1		AWGN	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		I.D.		
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS	1	dB	0	0
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.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

	Parameter	Config	Unit	Test 1	Test 2
	NR_TDD_FR2_A				TBD
M	NR_TDD_FR2_B				TBD
N_{oc}	NR_TDD_FR2_F	1	dBm/15kHz	TBD	TBD
Note2	NR_TDD_FR2_G	'	UDIII/ IOKI IZ	100	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B		dBm/CSI-RS		TBD
N_{oc}	NR_TDD_FR2_F	1	SCS	TBD	TBD
Note2	NR_TDD_FR2_G	'	303	100	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1	dB	TBD	TBD
CSI-RS	NR_TDD_FR2_A		dBm/CSI-RS		TBD
RSRP	NR_TDD_FR2_B	1	SCS	TBD	TBD
Note3	NR_TDD_FR2_F		505		TBD

	NR_TDD_FR2_G				TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
	NR_TDD_FR2_A				TBD
	NR_TDD_FR2_B		dD/05 04M		TBD
lo Note3	NR_TDD_FR2_F		dBm/95.04M Hz	TBD	TBD
10	NR_TDD_FR2_G] '		עסו	TBD
	NR_TDD_FR2_T				TBD
	NR_TDD_FR2_Y				TBD
\hat{E}_s/N_{oc}		1	dB	TBD	TBD

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.

A.7.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in sections 10.1.20.2.

Editor's Note: which reports are used to verify the accuracy is FFS

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

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 Section 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in Section 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This section defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB Ês/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/	dB	
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	uБ
	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	
NOTE 1: NR	operating band groups are defined in Section	n 3.5.2.		

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

	Minimum	SSB Ês/lot		
NR operating band groups Note1	dBm / S	dB		
	SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	uв	
NR_TDD_FR2_A	TBD	TBD		
NR_TDD_FR2_B	TBD	TBD		
NR_TDD_FR2_F	TBD	TBD	TBD	
NR_TDD_FR2_G	TBD	TBD		
NR_TDD_FR2_T	TBD	TBD		
NR_TDD_FR2_Y	TBD	TBD		
	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T	NR operating band groups dBm / 3 SCSssB = 120 kHz SCSssB = 120 kHz NR_TDD_FR2_A TBD NR_TDD_FR2_B TBD NR_TDD_FR2_F TBD NR_TDD_FR2_G TBD NR_TDD_FR2_T TBD	SCS _{SSB} = 120 kHz SCS _{SSB} = 240 kHz NR_TDD_FR2_A TBD TBD NR_TDD_FR2_B TBD TBD NR_TDD_FR2_F TBD TBD NR_TDD_FR2_G TBD TBD NR_TDD_FR2_T TBD TBD NR_TDD_FR2_T TBD TBD	

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This section defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB $\hat{E}s/Iot$, 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 section.

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 section.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

In Annex B.2, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in Section 9,
 - UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in Section 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in Section 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in Section 10.

B.2.2 Conditions for NR intra-frequency measurements

This section defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/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

		Minimum	SSB Ês/lot		
Parameter	NR operating band groups Note1	dBm /	dB		
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	uБ	
	NR_FDD_FR1_A, NR_TDD_FR1_A	-127	-124		
Conditions	NR_FDD_FR1_B	-126.5	-123.5		
	NR_TDD_FR1_C	-126	-123		
	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: NF	R operating band groups are defined in Section	า 3.5.2.			

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

		Minimum	SSB Ês/lot			
Parameter	NR operating band groups Note1	dBm/	4D			
		SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dB		
	NR_TDD_FR2_A	TBD	TBD			
	NR_TDD_FR2_B	TBD	TBD			
Conditions	NR_TDD_FR2_F	TBD	TBD	TBD		
Conditions	NR_TDD_FR2_G	TBD	TBD			
	NR_TDD_FR2_T	TBD	TBD			
	NR_TDD_FR2_Y	TBD	TBD			

NOTE 1: NR operating band groups are defined in Section 3.5.3.

B.2.3 Conditions for NR inter-frequency measurements

This section defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB Ês/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

		Minimum	SSB Ês/lot			
Parameter	NR operating band groups Note1	dBm /	AD.			
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB		
	NR_FDD_FR1_A, NR_TDD_FR1_A	-125	-122			
Conditions	NR_FDD_FR1_B	-124.5	-121.5			
	NR_TDD_FR1_C	-124	-121			
	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 Section 3.5.2.

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

		Minimum	SSB Ês/lot			
Parameter	NR operating band groups Note1	dBm/	ط ام			
		SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dB		
	NR_TDD_FR2_A	TBD	TBD			
	NR_TDD_FR2_B	TBD	TBD			
Conditions	NR_TDD_FR2_F	TBD	TBD	TBD		
Conditions	NR_TDD_FR2_G	TBD	TBD			
	NR_TDD_FR2_T	TBD	TBD			
	NR_TDD_FR2_Y	TBD	TBD			

NOTE 1: NR operating band groups are defined in Section 3.5.3.

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 TS 38.101-1 [18, Section 7.3A.3], 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 section 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 TS 38.101-1 [18, Section 7.3A.3], 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 section applies, then the relaxation specified in Section 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 section, 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 TS 38.101-1 [18, Section 7.3.2], and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [18, Section 7.3A.4], 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 TS 38.101-1 [18, Section 7.3A.4], and
- the exception requirements specified in TS 38.101-1 [18, Section 7.3A.4] apply.

If the relaxation Δ specified in this section applies, then the relaxation specified in Section 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 section, 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 TS 38.101-1 [18, Section 7.3.2], and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [18, Section 7.3A.5], 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 TS 38.101-1 [18, Section 7.3A.5] apply.

If the relaxation Δ specified in this section applies, then the relaxation specified in Section B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

Editor's note: TBD

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 TS 38.101-2 [19, Section 7.3A.2.1] 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 TS 38.101-2 [19, Section 7.3A.2.1] 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

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 TS 38.101-1 [18, Section 7.3C.3], 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 section 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 section, 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 TS 38.101-1 [18, Section 7.3.2], and L2 is the reference sensitivity level based on the requirements in TS 38.101-1 [18, Section 7.3C.2], 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 TS 38.101-1 [18, Section 7.3C.2], and
- the exception requirements specified in TS 38.101-1 [18, Section 7.3C.2] apply.

If the relaxation Δ specified in this section applies, then the relaxation specified in Section 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	R4-1709413				Capture TPs approved in the meeting	0.2.0
	AH #3						
2017-10	RAN4#84	R4-1711985				Capture TPs approved in the meeting	0.3.0
	-Bis					-	
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	15.2.0
						RAN4 #86bis and RAN4 #87	
2018-09	RAN#81	RP-181896	0043		В	CR to TS 38.133: Implementation of endorsed draft CRs from	15.3.0
						RAN4-AH-1807 and RAN4 #88	
2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from	15.4.0
						RAN4-88bis and RAN4-89	

History

	Document history					
V15.2.0	July 2018	Publication				
V15.3.0	October 2018	Publication				
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