ETSI TS 138 133 V15.7.0 (2019-10)



5G;

NR;

Requirements for support of radio resource management (3GPP TS 38.133 version 15.7.0 Release 15)



Reference RTS/TSGR-0438133vf70 Keywords 5G

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Foreword

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

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

Version x.y.z

where:

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

1 Scope

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

2 References

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

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

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

[20]	3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[21]	3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".
[22]	3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
[23]	3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
[24]	3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA); Overall description".
[25]	3GPP TS 36.101: "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
[26]	3GPP TS 38.214: "NR; Physical layer procedures for data".
[27]	3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".
[28]	3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

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

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

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

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

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

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

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

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

gNB: as defined in TS 38.300 [10].

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

3.2 Symbols

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

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

decision about that value was not taken.

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

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

3.3 Abbreviations

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

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

BM-RS Beam Management Reference Signal

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

CP Cyclic Prefix

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

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal DRX Discontinuous Reception

E-CID Enhanced Cell ID E-UTRA Evolved UTRA E-UTRAN Evolved UTRAN

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

FR Frequency Range

HARQ Hybrid Automatic Repeat Request

HO Handover L1-RSRP Layer 1 RSRP

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

MGRP Measurement Gap Repetition Period

MIB Master Information Block

MN Master Node

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

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

NR New Radio

NR-DC NR-NR Dual Connectivity

OFDM Orthogonal Frequency Division Multiplexing
OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel PCC Primary Component Carrier

PCell Primary Cell

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

PRACH Physical RACH PSCell Primary SCell

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

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

RMSI Remaining Minimum System Information

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

SCC Secondary Component Carrier
SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SCS_{SSB} SSB subcarrier spacing
SDI Supplementary Downlink

SDL Supplementary Downlink SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information
SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

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

SSB Synchronization Signal Block

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

measured at the UE antenna connector.

SSS Secondary Synchronization Signal sTAG Secondary Timing Advance Group

SUL	Supplementary Uplink
TA	Timing Advance
TAG	Timing Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex TTI Transmission Time Interval

UE User Equipment

UL Uplink

3.4 Test tolerances

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

Editor's note: intended to capture test tolerances. OTA test tolerance or margin will be captured in this 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		NR SDL	
	Band group notation	Operating bands	Band group notation	Operating bands	Band group notation	Operating bands
Α	NR_FDD_FR1_A	n1, n70, n74 ⁴	NR_TDD_FR1_A	n34, n38, n39, n40, n50, n51	NR_SDL_FR1_A	n75, n76
В	NR_FDD_FR1_B	n66, n74 ³	NR_TDD_FR1_B	-	NR_SDL_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77 ¹ , n78, n79	NR_SDL_FR1_C	-
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77 ²	NR_SDL_FR1_D	-
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41	NR_SDL_FR1_E	-
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-	NR_SDL_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20,	NR_TDD_FR1_G	=	NR_SDL_FR1_G	-
		n71				
Н	NR_FDD_FR1_H	n25	NR_TDD_FR1_H	-	NR_SDL_FR1_H	-

NOTE 1: Except 3.8 GHz to 4.2 GHz.

NOTE 2: Only 3.8 GHz to 4.2 GHz.

NOTE 3: Except 1475.9 MHz to 1510.9 MHz.

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

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

3.5.3 NR operating bands in FR2

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

Table 3.5.3-1: NR frequency band groups for FR2

Group	Band group notation	Operating bands
Α	NR_TDD_FR2_A	n257 ¹ , n258 ¹ , n261 ¹
В	NR_TDD_FR2_B	n257 ⁴ , n258 ⁴ , n261 ⁴
С	NR_TDD_FR2_C	
D	NR_TDD_FR2_D	
E	NR_TDD_FR2_E	
F	NR_TDD_FR2_F	n260⁴
G	NR_TDD_FR2_G	n260¹
Н	NR_TDD_FR2_H	
I	NR_TDD_FR2_I	
J	NR_TDD_FR2_J	
K	NR_TDD_FR2_K	
L	NR_TDD_FR2_L	n257 ² , n258 ² , n261 ²
M	NR_TDD_FR2_M	
N	NR_TDD_FR2_N	
0	NR_TDD_FR2_O	
Р	NR_TDD_FR2_P	
Q	NR_TDD_FR2_Q	
R	NR_TDD_FR2_R	
S	NR_TDD_FR2_S	
Т	NR_TDD_FR2_T	n257 ³ , n258 ³ , n261 ³
U	NR_TDD_FR2_U	
V	NR_TDD_FR2_V	
W	NR_TDD_FR2_W	
Χ	NR_TDD_FR2_X	
Υ	NR_TDD_FR2_Y	n260 ³
	UE power class 1.	
	UE power class 2.	
	UE power class 3.	
NOTE 4:	UE power class 4.	

3.6 Applicability of requirements in this specification version

In this specification,

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

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

3.6.1 RRC connected state requirements in DRX

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

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

Otherwise the UE shall assume that DRX is used.

3.6.2 Number of serving carriers

3.6.2.1 Number of serving carriers for SA

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

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

3.6.2.2 Number of serving carriers for EN-DC

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

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

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

3.6.2.3 Number of serving carriers for NE-DC

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

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

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

3.6.2.4 Number of serving carriers for NR-DC

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

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

3.6.3 Applicability for intra-band FR2

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

3.6.4 Applicability for FR2 UE power classes

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

3.6.5 Applicability for SDL bands

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

3.6.6 Applicability of requirements for NGEN-DC operation

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

4 SA: RRC_IDLE state mobility

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

4.1 Cell Selection

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

4.2 Cell Re-selection

4.2.1 Introduction

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

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

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

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

4.2.2 Requirements

4.2.2.1 UE measurement capability

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

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

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

4.2.2.2 Measurement and evaluation of serving cell

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

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

otherwise M1=1.

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

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

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

Table 4.2.2.2-1: N_{serv}

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

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

4.2.2.3 Measurements of intra-frequency NR cells

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

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

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

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

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

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

when rangeToBestCell is not configured:

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

when rangeToBestCell is configured:

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

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

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

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

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

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

Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1.

4.2.2.4 Measurements of inter-frequency NR cells

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

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

If $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below in this 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 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP

reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities. The parameter $K_{carrier}$ is the number of NR inter-frequency carriers indicated by the serving cell. An inter-frequency cell is considered to be detectable according to the conditions defined in Annex B.1.3 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every 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 is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 or.

when rangeToBestCell is configured:

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

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

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

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

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

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

Scaling Factor (N1)		Tdetect,NR_Inter [S]	Tmeasure,NR_Inter [S]	Tevaluate,NR_Inter [S]
FR1	FR2 ^{Note1}	cycles)	cycles)	(number of DRX cycles)
	8	11.52 x N1 x 1.5 (36 x	1.28 x N1 x 1.5 (4 x N1	5.12 x N1 x 1.5 (16 x
		N1 x 1.5)	x 1.5)	N1 x 1.5)
1	5	17.92x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
	4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
	3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)
		FR1 FR2 ^{Note1}	FR1 FR2Note1 (number of DRX cycles) 8 11.52 x N1 x 1.5 (36 x N1 x 1.5) 1 5 17.92x N1 (28 x N1) 4 32 x N1 (25 x N1)	TR1 FR2Note1 (number of DRX cycles)

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

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

4.2.2.5 Measurements of inter-RAT E-UTRAN cells

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

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

The requirements in this 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 $Squal \leq S_{nonIntraSearchQ}$ when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

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

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,EUTRAN}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this 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 TS 38.304 [1], the UE shall evaluate this E-UTRA cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

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

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

4.2.2.6 Maximum interruption in paging reception

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

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

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

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

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

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

4.2.2.7 General requirements

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

5 SA: RRC_INACTIVE state mobility

5.1 Cell Re-selection

5.1.1 Introduction

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

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

5.1.2 Requirements

5.1.2.1 UE measurement capability

The requirements in sub-clause 4.2.2.1 shall apply.

5.1.2.2 Measurement and evaluation of serving cell

The requirements in sub-clause 4.2.2.2 shall apply.

5.1.2.3 Measurements of intra-frequency NR cells

The requirements in sub-clause 4.2.2.3 shall apply.

5.1.2.4 Measurements of inter-frequency NR cells

The requirements in sub-clause 4.2.2.4 shall apply.

5.1.2.5 Measurements of inter-RAT E-UTRAN cells

The requirements in sub-clause 4.2.2.5 shall apply.

5.1.2.6 Maximum interruption in paging reception

The requirements in sub-clause 4.2.2.6 shall apply.

5.1.2.7 General requirements

The requirements in sub-clause 4.2.2.7 shall apply.

5.2 Void

6 RRC_CONNECTED state mobility

6.1 Handover

6.1.1 NR Handover

6.1.1.1 Introduction

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

6.1.1.2 NR FR1 - NR FR1 Handover

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

6.1.1.2.1 Handover delay

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 6.1.1.2.2.

6.1.1.2.2 Interruption time

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

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

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

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 -2 dB, then $T_{search} = T_{rs} + 2$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geq -2 dB, then $T_{search} = 3*T_{rs} + 2$ 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 the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

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

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 $T_{interrupt}$

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

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 -2 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 the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

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

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 a known cell, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = 8*T_{rs} + 2$ ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geqslant -2 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. $T_{\Delta} = 1*T_{rs}$ for both known and unknown target cell.

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

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

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

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

- the UE has sent a valid measurement report for the target cell and
- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3 of TS 38.133 [50],
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3 of TS 38.133 [50].

otherwise it is unknown.

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

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 a known cell, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = 8* T_{rs} + 2$ ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geqslant -2 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. $T_{\Delta} = 1 * T_{rs}$ for both known and unknown target cell.

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

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

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

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

- the UE has sent a valid measurement report for the target cell and
- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3 of TS 38.133 [50],
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3 of TS 38.133 [50].

otherwise it is unknown.

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

6.1.2 NR Handover to other RATs

6.1.2.1 NR – E-UTRAN Handover

6.1.2.1.1 Introduction

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

6.1.2.1.2 Handover delay

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

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

Where:

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

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

6.1.2.1.3 Interruption time

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

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

Where:

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

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

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

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

6.2 RRC Connection Mobility Control

6.2.1 SA: RRC Re-establishment

6.2.1.1 Introduction

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

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

6.2.1.2 Requirements

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

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

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

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

6.2.1.2.1 UE Re-establishment delay requirement

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

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

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

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

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

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

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

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

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

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

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

 T_{PRACH} : It is the delay 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; $N_{\text{freq}} = 1$ if the target intra-frequency NR cell is known, else $N_{\text{freq}} = 2$ and $T_{\text{identify_intra_NR}} = 0$ if the target inter-frequency NR cell is known.

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

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

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

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

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

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

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

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

6.2.2 Random access

6.2.2.1 Introduction

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

6.2.2.2 Requirements

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

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

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

6.2.2.2.1 Contention based random access

6.2.2.2.1.1 Correct behaviour when transmitting Random Access Preamble

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

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

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

6.2.2.2.1.2 Correct behaviour when receiving Random Access Response

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

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

6.2.2.2.1.3 Correct behaviour when not receiving Random Access Response

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

6.2.2.2.1.4 Correct behaviour when receiving an UL grant for msg3 retransmission

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

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

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

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

6.2.2.2.1.6 Correct behaviour when contention Resolution timer expires

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

6.2.2.2.2 Non-Contention based random access

6.2.2.2.2.1 Correct behaviour when transmitting Random Access Preamble

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

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

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

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

6.2.2.2.2.2 Correct behaviour when receiving Random Access Response

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

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

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

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

6.2.2.2.2.3 Correct behaviour when not receiving Random Access Response

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

6.2.2.2.3 UE behaviour when configured with supplementary UL

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

6.2.3 SA: RRC Connection Release with Redirection

6.2.3.1 Introduction

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

6.2.3.2 Requirements

6.2.3.2.1 RRC connection release with redirection to NR

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

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

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

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

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

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

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

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

 T_{RACH} : It is the delay 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.

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

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

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

Frequency range (FR) of target NR cell		Tidentify-NR
FR1		MAX (680 ms, 11 x T _{rs})
FR2		MAX (880 ms, 8x11 x T _{rs})
Note:	If the UE has been provided with higher layer signaling of smtc2 specified in TS 38.331 [2] prior to the	
	redirection command, T _{rs} follows <i>smtc1</i> or <i>smtc2</i> 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 $T_{connection_release_redirect_E-UTRAN}$.

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

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

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

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

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

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

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

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

7 Timing

7.1 UE transmit timing

7.1.1 Introduction

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

7.1.2 Requirements

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

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

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

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

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

60

120

60

120

3.5*64*T_c

3.5*64*T_c

3*64*Tc

3*64*Tc

Table 7.1.2-1: Te Timing Error Limit

120

240

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

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

Freque	ncy range and band of cell used for uplink transmission	N _{TA offset} (Unit: Tc)
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)		0 (Note 1)
FR1 TDD band with LTE-NR coexistence case		39936 (Note 1)
FR2		13792
Note 1:	Note 1: The UE identifies $N_{ m TA~offset}$ based on the information n-	
	TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of $N_{\mathrm{TA~offset}}$	

the value 39936 of $N_{\mathrm{TA\,offset}}$ can also be provided for a FDD serving cell. Note 2: Void

2

Note 1:

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.

is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is

provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] and

Table 7.1.2-3: void

7.1.2.1 Gradual timing adjustment

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

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

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

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

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

7.1.2.2 One shot timing adjustment

When the magnitude of the ΔT exceeds H then the UE shall adjust its transmission timing in one adjustment only once provided that the following conditions are met at the UE. Otherwise when the the magnitude of the $\Delta T \leq H$ then the UE shall adjust its transmission timing according to the rules defined in clause 7.1.2.1.

- SSB_RP and SSB Ês/Iot according to Annex B.2.6.1 for a corresponding operating Band,

The UE transmit timing immediately after applying the one shot timing adjustment shall be: $T_2 - (N_{TA} + N_{TA \text{ offset}}) + 2 \times (T_1 - T_2)$. After applying the one shot timing adjustment the UE shall adjust its transmission timing according to the rules defined in clause 7.1.2.1.

Where: $\Delta T = |T_1 - T_2|$

- T₁ is the reception time at the UE just before the one shot timing adjustment,
- T_2 is the reception time to be used at the UE just after the one shot timing adjustment,
- H is defined in table 7.1.2.2-1.

Table 7.1.2.2-1: The value of H

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals s(kHz)	H [Tc]
		15	TBD
	15	30	TBD
1		60	TBD
I		15	TBD
	30	30	TBD
		60	TBD
	120	60	TBD
2		120	TBD
		60	TBD
240		120	TBD

7.2 UE timer accuracy

7.2.1 Introduction

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

7.2.2 Requirements

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

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

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

Table 7.2.2-1

Timer value [s]	Accuracy
timer value < 4	± 0.1s
timer value ≥ 4	± 2.5%

7.3 Timing advance

7.3.1 Introduction

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

7.3.2 Requirements

7.3.2.1 Timing Advance adjustment delay

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

7.3.2.2 Timing Advance adjustment accuracy

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

Table 7.3.2.2-1: UE Timing Advance adjustment accuracy

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

7.4 Cell phase synchronization accuracy

7.4.1 Definition

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

7.4.2 Minimum requirements

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

7.5 Maximum Transmission Timing Difference

7.5.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundary of E-UTRA PCell and 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.

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

7.5.2 Minimum Requirements for inter-band EN-DC

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

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

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

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

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		

7.5.3 Minimum Requirements for intra-band EN-DC

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

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [16].

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.3-1 for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is only capable of synchronous EN-DC operation [16].

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

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

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

Editot's Note: UE transmit signal quality degradation could be expected if the maximum transmit time difference exceeds a certain threshold. The threshold and how to specify corresponding requirements is FFS.

7.5.4 Minimum Requirements for NR Carrier Aggregation

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

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

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

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

7.5.5 Minimum Requirements for inter-band NE-DC

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

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

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

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell as shown in Table 7.5.5-2 for inter-band synchronous NE-DC. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.5.5-2: Maximum uplink transmission timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	35.21
30	15	35.21
60	15	35.21
120	15	35.21
NOTE 1: Void		

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

7.5.6 Minimum Requirements for inter-band NR DC

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

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

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

7.6 Maximum Receive Timing Difference

7.6.1 Introduction

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

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

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

7.6.2 Minimum Requirements for inter-band EN-DC

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

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

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

NOTE 1: 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 clause 7.6.3 and this Table 7.6.2-1 is also applicable, the scenario with 120 kHz does not exit.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver as shown in Table 7.6.2-2. 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

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

Table 7.6.2-3 Void

7.6.3 Minimum Requirements for intra-band EN-DC

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

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

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.3-1. 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 of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) ^{Note1}	Maximum receive timing difference (µs)	
15	15	3	
15	30	3	
15	60	3	
NOTE 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}.			

Table 7.6.3-2 Void

7.6.4 Minimum Requirements for NR Carrier Aggregation

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

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

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

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

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

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

7.6.5 Minimum Requirements for inter-band NE-DC

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

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

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

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5-2. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR TDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD interband NE-DC.

Table 7.6.5-2: Maximum receive timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note1)	Maximum receive timing difference (μs)
15	15	
30	15	33
60	15	
120	15	
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		
NOTE 2: Void		

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

7.6.6 Minimum Requirements for inter-band NR DC

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

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

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

7.7 deriveSSB-IndexFromCell tolerance

7.7.1 Minimum requirements

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

7.8 Void

8 Signalling characteristics

8.1 Radio Link Monitoring

8.1.1 Introduction

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

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

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

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

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

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

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

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

Configuration	BLERout	BLERin
0	10%	2%

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

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

Carrier frequency range of	I	Maximum number of RLM-RS	
PCell/PSCell	max max	resources, N _{RLM}	
FR1, ≤ 3 GHz ^{Note}	4	2	
FR1, > 3 GHz ^{Note}	8	4	
FR2	64	8	
NOTE: For unpaired spectrum operation with Case C - 30 kHz SCS, 3GHz is replaced by 2.4GHz, as specified in			
clause 4.1 in TS 38 213 [้วโ		

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 clause 8.1.2.2.

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

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

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

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 (PRBs)	24
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

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 $T_{\text{Evaluate_out_SSB}}$ [ms] period becomes worse than the threshold $Q_{\text{out_SSB}}$ within $T_{\text{Evaluate_out_SSB}}$ [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.

 $T_{\text{Evaluate_out_SSB}}$ and $T_{\text{Evaluate_in_SSB}}$ are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8.

For FR1,

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

For FR2.

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when RLM-RS is not overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{\text{sharing factor}}$, when the RLM-RS is not overlapped with measurement gap and RLM-RS is fully overlapped with SMTC period ($T_{\text{SSB}} = T_{\text{SMTCperiod}}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when the RLM-RS is partially overlapped with measurement gap and the 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 $T_{SSB} < 0.5*T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the RLM-RS is partially overlapped with measurement gap and the 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 $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP,T_{SMTCperiod})}}$, when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$) $P_{sharing\ factor} = 1$
 - if all of the reference signals configured for RLM outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for RLM outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

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

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

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

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_} SSB (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 the SSB configured for RLM. T _{DRX} is the DRX cycle length.				

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

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

8.1.2.3 Measurement restrictions for SSB based RLM

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

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

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

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

8.1.3 Requirements for CSI-RS based radio link monitoring

8.1.3.1 Introduction

The requirements in this 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 clause 8.1.3.2. UE is not expected to perform radio link monitoring measurements on the CSI-RS configured as RLM-RS if the CSI-RS is not in the active TCI state of any CORESET configured in the UE active BWP.

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

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

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 (PRBs) 48 Sub-carrier spacing (kHz) SCS of the active DL BWP DMRS precoder granularity REG bundle size REG bundle size 6 CP length Normal Mapping from REG to CCE Distributed

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

8.1.3.2 Minimum requirement

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

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

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

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

For FR1,

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

For FR2,

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

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}},$ when the RLM-RS is partially overlapped with measurement gap and the RLM-RS
 - is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the RLM-RS is partially overlapped with measurement gap and the 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 $T_{CSI-RS} = 0.5 *T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRGP,T_{SMTCperiod})}}$, when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when the RLM-RS is partially overlapped with measurement gap and the 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 for RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.

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

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

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

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

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

Table 8.1.3.2-2: Evaluation period T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} for FR2

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

8.1.3.3 Measurement restrictions for CSI-RS based RLM

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

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

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

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

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

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

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

For FR2, when the CSI-RS for RLM is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement.

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

8.1.4 Minimum requirement at transitions

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

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

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

8.1.5 Minimum requirement for UE turning off the transmitter

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

8.1.6 Minimum requirement for L1 indication

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

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

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

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

In case DRX is used, $T_{Indication_interval}$ is Max(10ms, 1.5*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 on frequency range FR2 has different subcarrier spacing than PDSCH/PDCCH, there are restrictions on the scheduling availability as described in the following clauses.

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

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

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

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

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

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

8.1.7.3 Scheduling availability of UE performing radio link monitoring on FR2

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

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

- There are no scheduling restrictions due to radio link monitoring based on the CSI-RS.

- Otherwise

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

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

For FR2, if following conditions are met,

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

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

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

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

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

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

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

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8.2 Interruption

8.2.1 EN-DC Interruption

8.2.1.1 Introduction

This 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, or

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

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

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

This 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 TS 36.133 [15].

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

8.2.1.2 Requirements

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

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

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

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

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

8.2.1.2.2 Interruptions at transitions from non-DRX to DRX

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

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

8.2.1.2.3 Interruptions at SCell addition/release

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

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

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

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

When one SCell in SCG is added or released:

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

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

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

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

μ	NR Slot length		n length X1 lot	Interruption I	ength Y1 slot
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3
2	0.25		5	4	5
3	0.125		9	N/A	- N/A

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

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

8.2.1.2.4 Interruptions at SCell activation/deactivation

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

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

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

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

When one SCell in SCG is activated or deactivated:

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

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

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

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

μ	NR Slot length		n length X2 lot	Interruption I	ength Y2 slot
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	3		2	3
3	0.125		5	N/A	N/A

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

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

8.2.1.2.5 Interruptions during measurements on SCC

8.2.1.2.5.1 Interruptions during measurements on deactivated NR SCC

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

8.2.1.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

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

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

Each interruption shall not exceed

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

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

μ	NR Slot length	Interruption length X3 slot		Interruption len	gth Y3 slot ^{Note 1}
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125	5		N/A	N/A

8.2.1.2.6 Interruptions at UL carrier RRC reconfiguration

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

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

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

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

8.2.1.2.7 Interruption due to Active BWP switching Requirement

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

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

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

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.1.2.7-1: interruption length X

μ	NR Slot length (ms)	Interruption length X (slots ^{note 1})	
0	1	1	
1	0.5	1	
2	0.25	3	
3	0.125	5	
Note1:	If the BWP switch involves changing of SCS, the interruption due to BWP switch is determined by the 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	From TC 20 224 [2]	
nrofSRS-Ports	From TS 38.331 [2]	
Editor's note: More parameters can be added if identified		

8.2.2 SA: Interruptions with Standalone NR Carrier Aggregation

8.2.2.1 Introduction

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

up to 7 SCells are configured, deconfigured, activated or deactivated, or

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

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell or SCell.

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

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

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

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

8.2.2.2 Requirements

8.2.2.2.1 Interruptions at SCell addition/release

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

- an interruption on any active serving cell:

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

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

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

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 active serving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.		

8.2.2.2.2 Interruptions at SCell activation/deactivation

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

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

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

μ	NR Slot length (ms) of victim cell	Interruption length (slot)	
0	1		1
1	0.5		1
2	0.25	Both aggressor cell and victim cell are on FR2	2
		Either aggressor cell or victim cell is on FR1	3
3	0.125	Aggressor cell is on FR2	4
		Aggressor cell is on FR1	5
Note:	ote: Tsmtc_duration is - the longest SMTC duration among all above active serving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.		

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

μ	NR Slot length (ms)	Interruption length
0	1	1 + T _{SMTC_duration}
1	0.5	1 + T _{SMTC_duration}
2	0.25	2 + T _{SMTC_duration}
3	0.125	4 + T _{SMTC_duration}
- 6 1 6	above active serv being activated whactivated; the longest SMT	C duration among all s in the same band when

8.2.2.2.3 8.2.2.2.3 Interruptions during measurements on deactivated SCC

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

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

8.2.2.2.4 Interruptions at UL carrier RRC reconfiguration

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

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

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

μ	NR Slot length (ms)	Interruption length
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

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

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

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

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

Table 8.2.2.2.5-1: Interruption length X

Interruption length X

NR Slot

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 8.2.2.2.5-2: Parameters which cause interruption other than SCS

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

8.2.2.2.6 Interruptions at inter-frequency SFTD measurement

8.2.2.2.6 Interruptions at inter-frequency SFTD measurement

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

For a UE with per-FR gap capability:

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

For a UE with per-UE gap capability:

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

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

SFTD	Serving	Neighbour cell SMTC periodicity					
configuration	cell μ	5ms	10ms	20ms	40ms	80ms	160ms
With RSRP	0						
report	1	[8.4%]	[6 20/]	[8.4%]	[6.3%]	[5.3%]	[4 70/]
	2	[0.4%]	[6.3%]	[0.4%]	[0.3%]	[3.3%]	[4.7%]
	3						
Without RSRP	0						
report	1	[11.4%]	10 60/1	[7 00/1	[6 00/]	[6 20/1	[6 O0/]
	2	[11.470]	[8.6%]	[7.9%]	[6.8%]	[6.3%]	[6.0%]
	3						

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

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

Table 8.2.2.2.6-3: Void

Table 8.2.2.2.6-4: Void

8.2.3 NE-DC Interruptions

8.2.3.1 Introduction

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

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

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

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

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

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

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

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

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

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

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

8.2.3.2 Requirements

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

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

Each interruption shall not exceed X slot as defined in table 8.2.3.2.1-1.

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

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

8.2.3.2.2 Interruptions at transitions from non-DRX to DRX

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

8.2.3.2.3 Interruptions at PSCell/SCell addition/release

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

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

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

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

When one SCell in MCG is added or released:

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

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

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

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

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

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

8.2.3.2.4 Interruptions at SCell activation/deactivation

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

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

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

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

When one SCell in MCG is activated or deactivated:

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

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

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

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

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

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

8.2.3.2.5 Interruptions during measurements on SCC

8.2.3.2.5.1 Interruptions during measurements on deactivated NR SCC

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

8.2.3.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

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

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

Each interruption shall not exceed

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

Where X3 and Y3 are specified in Table 8.2.3.2.5-1

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

μ	NR Slot length		n length X3 lot	Interruption len	gth Y3 slot ^{Note 1}
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125		5	N/A	N/A

8.2.3.2.6 Interruptions at UL carrier RRC reconfiguration

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

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

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

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

8.2.3.2.7 Interruption due to Active BWP switching Requirement

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

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

8.2.4 NR-DC: Interruptions

8.2.4.1 Introduction

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

up to TBD SCells are configured, deconfigured, activated or deactivated deactivated or,

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

measurements on SCC with deactivated SCell in NR SCG, or

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

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

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

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

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

8.2.4.2 Requirements

8.2.4.2.1 Interruptions at PSCell/SCell addition/release

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

- an interruption on any active serving cell:

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

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

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

Table 8.2.4.2.1-2: Interruption duration for SCell addition/release for intra-band DC/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 activeserving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.	

8.2.4.2.2 Interruptions at SCell activation/deactivation

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

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

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

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

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

μ	NR Slot length (ms)	Interruption length
0	1	1 + T _{SMTC_duration}
1	0.5	1 + T _{SMTC_duration}
2	0.25	2 + T _{SMTC_duration}
3	0.125	4 + T _{SMTC_duration}
- 6 k - -	above active servi being activated whactivated; the longest SMT	C duration among all s in the same band when

8.2.4.2.3 Interruptions during measurements on SCC

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

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

8.2.4.2.4 Interruptions at UL carrier RRC reconfiguration

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

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

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

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

8.2.4.2.5 Interruption due to Active BWP switching Requirement

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

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

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

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

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

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

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

8.2.4.2.7 Interruptions at transitions from non-DRX to DRX

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

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

8.3 SCell Activation and Deactivation Delay

8.3.1 Introduction

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

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

8.3.2 SCell Activation Delay Requirement for Deactivated SCell

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

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

Upon receiving SCell activation command in slot n, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot n + $T_{\underline{HARQ} + T_{activation} + T_{CSI_Reporting}}$, where:

NR slot length

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

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

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

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

If the SCell is unknown and belongs to FR1, Tactivation_time is:

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

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

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

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

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

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

- T_{FineTiming} + 5ms, if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.
- max (3ms, Tuncertainty) + THARQ + TFineTiming + 5ms, if UE receives TCI state activation command after SCell activation command.

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

 $max(T_{uncertainty_MAC} + 5ms + T_{FineTiming}, T_{uncertainty_RRC} + T_{RRC_delay})$

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

```
8ms + 24*T_{rs} + T_{uncertainty\_MAC} + T_{L1-RSRP, \, measure} + T_{L1-RSRP, \, report} + T_{HARQ} + T_{FineTiming}
```

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, then Tactivation time is:

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

Where.

 T_{SMTC_MAX} :

- In FR1, in case of intra-band SCell activation, T_{SMTC MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, $T_{SMTC\ MAX}$ is the SMTC periodicity of SCell being activated.

- In FR2, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided that in Rel-15 only support FR2 intra-band CA.
- T_{SMTC MAX} is bounded to a minimum value of 10ms.

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

 $T_{FirstSSB}$: Is the time to first SSB indicated by the SMTC after $n + T_{HARQ} + 3ms$

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

T_{uncertainty} is the time period between reception of SCell activation MAC-CE and TCI activation MAC-CE for known case. For unknown case, uncertainty is the time between the first L1-RSRP reporting and when UE receives TCI activation MAC-CE.

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

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

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

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

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

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

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

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

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

- During the period equal to max([5] measCycleSCell, [5] DRX cycles) for FR1 before the reception of the SCell activation command:
 - the UE has sent a valid measurement report for the SCell being activated and
 - the SSB measured remains detectable according to the cell identification conditions specified in clause 9.2 and 9.3.
- the SSB measured during the period equal to max([5] measCycleSCell, [5] DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

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

- During the period equal to [4s] for UE supporting power class1 and [3s] for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):
 - the UE has sent a valid L3-RSRP measurement report with SSB index
 - SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation
- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

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

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

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

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

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

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

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

8.3.3 SCell Deactivation Delay Requirement for Activated SCell

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

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

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 12 in TS 38.331 [2].

8.4.3 UE UL carrier deconfiguration delay requirement

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

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

8.5 Link Recovery Procedures

8.5.1 Introduction

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

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

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

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

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

Upon request the UE shall deliver configuration indexes from the set \overline{q}_1 as specified in TS 38.213 [3], to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Q_{in_LR} , which is indicated by higher layer parameter rsrp-ThresholdSSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained from a SSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer parameter powerControlOffsetSS. The RS resource configurations in the set \overline{q}_1 can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS resources. UE is not required to perform candidate beam detection outside the active DL BWP.

8.5.2 Requirements for SSB based beam failure detection

8.5.2.1 Introduction

The requirements in this 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 is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2.

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

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM	2
symbols	2
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 (PRBs)	24
Sub-carrier spacing (kHz)	Same as the SCS of RMSI CORESET
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.5.2.2 Minimum requirement

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

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

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

For FR1,

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

For FR2,

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

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

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

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the BFD resource is partially overlapped with measurement gap and the BFD resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP, T_{SMTCperiod})}}$, when the BFD resource is partially overlapped with measurement gap (T_{SSB}
 - <MGRP) and the BFD resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when the BFD resource is partially overlapped with measurement gap and the BFD resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1
 - if all of the reference signals configured for BFD outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for BFD outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;

 $_{sharing\ factor}$ = 3, otherwise. If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

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

Table 8.5.2.2-1: Evaluation period T_{Evaluate_BFD_SSB} for FR1

Configuration	T _{Evaluate_BFD_SSB} (ms)		
no DRX	Max([50], Ceil(5*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 SSB} for FR2

Configuration	T _{Evaluate_BFD_SSB} (ms)		
no DRX	Max([50], Cceil(5*P*N)*Tssb)		
DRX cycle ≤ 320ms	Mmax([50], Cceil(7.5*P*N)*Mmax(T _{DRX} ,T _{SSB}))		
DRX cycle > 320ms	Cceil(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.			

8.5.2.3 Measurement restriction for SSB based beam failure detection

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

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

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

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

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

8.5.3 Requirements for CSI-RS based beam failure detection

8.5.3.1 Introduction

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

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

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

8.5.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in set \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 requirements of T_{Evaluate_BFD_CSI-RS} apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 - \frac{T_{CSI-RS}}{MRGP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and

- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

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

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

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

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

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

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

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

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

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

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

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

Configuration	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-F}				
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 \leq 320ms				
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.				

8.5.3.3 Measurement restrictions for CSI-RS beam failure detection

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

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

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

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

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

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

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

For FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the
 other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no
 requirements are defined.
 - The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in set \overline{q}_1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,

- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the RS resources in set \overline{q}_0 is worse than $Q_{\text{out_LR}}$, 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 TS 38.331 [2].

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

When DRX is not used, $T_{Indication_interval_BFD}$ is max(2ms, $T_{SSB-RS,M}$) or max(2ms, $T_{CSI-RS,M}$), where $T_{SSB-RS,M}$ and $T_{CSI-RS,M}$ is the shortest periodicity of all RS resources in set \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* $T_{SSB-RS,M}$) if DRX cycle_length is less than or equal to 320ms for SSB based link quality measurement, and $T_{Indication_interval_BFD}$ is DRX_cycle_length if DRX cycle_length is greater than 320ms.

When DRX is used, $T_{Indication_interval_BFD}$ is Max $(1.5*DRX_cycle_length, 1.5*T_{CSI-RS,M})$ if DRX cycle_length is less than or equal to 320ms for CSI-RS based link quality measurement, and $T_{Indication_interval_BFD}$ 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 \overline{q}_1 configured for a serving cell, provided that the SSBs configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.5.2.

8.5.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set \bar{q}_1 estimated over the last T_{Evaluate_CBD_SSB} ms period becomes better than the threshold Q_{in_LR} provided SSB_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

The value of $T_{Evaluate_CBD_SSB}$ is defined in Table 8.5.5.2-1 for FR1.

The value of T_{Evaluate CBD SSB} is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8.

Where,

For FR1,

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

For FR2,

- $P = \frac{1}{1 - \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).

- P is $P_{sharing\ factor}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MRGP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5*T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MRGP, T_{SMTCperiod})}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1
 - if all of the reference signals configured for CBD outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
 - if all of the reference signal configured for CBD outside measurement gap and fully-overlapped by intrafrequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

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

Configuration		T _{Evaluate_CBD_SSB} (ms)	
non-DR	RX, DRX cycle	Ceil([3]*P) * T _{SSB}	
\$	≨ 320ms		
DRX cycle > 320ms		Ceil([3]*P) * T _{DRX}	
Note: T_{SSB} is the periodicity of SSB in the set \bar{q}_1 . T_{DRX} is the DRX cycle			
	length.		

Table 8.5.5.2-2: Evaluation period T_{Evaluate CBD SSB} for FR2

Configuration		T _{Evaluate_CBD_SSB} (ms)	
non-DRX, DRX cycle ≤ 320ms		Ceil([3]*P*N) * T _{SSB}	
- 7	≥ 320HS		
DRX c	ycle > 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.		

8.5.5.3 Measurement restriction for SSB based candidate beam detection

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

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

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

8.5.6 Requirements for CSI-RS based candidate beam detection

8.5.6.1 Introduction

The requirements in this 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 clause 8.5.6.2.

8.5.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period becomes better than the threshold $Q_{\text{in_LR}}$ within $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period provided CSI-RS \hat{E} s/Iot is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

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

The value of T_{Evaluate_CBD_CSI-RS} is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8.

For FR1,

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

For FR2,

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

 $P = \frac{1}{1 - \frac{T_{CSI-RS}}{MRGP} - \frac{T_{CSI-RS}}{T_{SMTCperiod}}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$

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

- $T_{SMTCperiod} \neq MGRP$ or

Note:

- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MRCP,T_{SMTCperiod})}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$

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

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

Longer evaluation period would be expected if the CSI-RS is on the same OFDM symbols with RLM/BFD/BM-RS, or other CBD-RS, according to the measurement restrictions defined in section 8.5.6.3.

The values of M_{CBD} used in Table 8.5.6.2-1 and Table 8.5.6.2-2 are defined as

DRX cycle length.

- $M_{CBD} = 3$, if the CSI-RS resource configured in the set \overline{q}_1 is transmitted with Density = 3.

 Configuration
 TEVALUATEC_CBD_CSI-RS (ms)

 non-DRX, DRX cycle
 Max([25], eil(McBD *P) * TcSI-RS)

 ≤ 320ms
 Ceil(McBD *P) *TDRX

T_{CSI-RS} is the periodicity of CSI-RS resource in the set \bar{q}_1 . T_{DRX} is the

Table 8.5.6.2-1: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR1

Table 8.5.6.2-2: Evaluation period T_{Evaluate CBD CSI-RS} for FR2

Configuration		TEvaluate_CBD_CSI-RS (ms)	
non-DRX, DRX cycle		Max([25], Ceil(M _{CBD} *P*N) * T _{CSI-RS})	
\$	320ms		
DRX cycle > 320ms		Ceil(M _{CBD} *P*N) *T _{DRX}	
Note: T_{CSI-RS} is the periodicity of CSI-RS resource in the set \bar{q}_1 . T_{DRX} is the			
DRX cycle length			

8.5.6.3 Measurement restriction for CSI-RS based candidate beam detection

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

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

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

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

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

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

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

8.5.7 Scheduling availability of UE during beam failure detection

Scheduling availability restrictions when the UE is performing beam failure detection are described in the following clauses.

8.5.7.1 Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to beam failure detection performed on SSB and CSI-RS configured for BFD with the same SCS as PDSCH or PDCCH in FR1.

8.5.7.2 Scheduling availability of UE performing beam failure detection with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to beam failure detection when SSB is configured as BFD. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to beam failure detection when SSB is configured as BFD.

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

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on FR1 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which PCell or PSCell is configured.

8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured
 and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource
 set with repetition ON
 - There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.
- Otherwise

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

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

For FR2, if following conditions are met,

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

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

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

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

There are no scheduling restrictions on FR1 serving cell(s) due to beam failure detection performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to beam failure detection performed on FR1 serving PCell and/or PSCell.

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

8.5.8 Scheduling availability of UE during candidate beam detection

Scheduling availability restrictions when the UE is performing L1-RSRP measurement for candidate beam detection are described in the following clauses.

8.5.8.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as link recovery detection resource with the same SCS as PDSCH or PDCCH in FR1.

8.5.8.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as link recovery detection resource. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as link recovery detection resource.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, TRS, CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for L1-RSRP.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on one serving cell apply to all other serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands.

8.5.8.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to candidate beam detection

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, CSI-RS for tracking or CSI-RS for CQI on reference symbols to be measured for candidate beam detection.

When intra-band carrier aggregation in FR2 is configured, the scheduling restrictions on to one serving cell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

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

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

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

8.5.8.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

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

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

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

8.6 Active BWP switch delay

8.6.1 Introduction

The requirements in this section apply for a UE configured with more than one BWP on PCell or any activated SCell in standalone NR or NE-DC, PCell, PSCell or any activated SCell in MCG or SCG in NR-DC, or PSCell or any activated SCell in SCG in EN-DC. UE shall complete the switch of active DL and/or UL BWP within the delay defined in this section.

8.6.2 DCI and timer based BWP switch delay

The requirements in this section only apply to the case that the BWP switch is performed on a single CC.

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after the beginning of DL 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 occurs. The UE is not required to follow the requirements defined in this section when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where n is the beginning of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer bwp-Inactivity Timer [2] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after the beginning of DL slot n+ $T_{BWPswitchDelay}$.

The UE is not required to transmit UL signals or receive DL signals after *bwp-InactivityTimer* [2] expires on the cell where 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.

NR Slot BWP switch delay TBWPswitchDelay (slots) μ length Type 1^{Note 1} Type 2Note 1 (ms) 0 1 0.5 2 5 9 2 0.25 3 18 3 0.125

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.

Provided the UE does not have the required TCI-state information to receive PDCCH and PDSCH in the new BWP, the UE shall use old TCI-states before the BWP switch until a new MAC CE updating the required TCI-state information for PDCCH and PDSCH is received after the BWP switch.

If UE has the information on the required TCI-state information to receive PDCCH and PDSCH in the new BWP,

- UE shall be able to receive PDCCH and PDSCH with old TCI-states before the delay as specified in Section 8.10 in the new BWP.
- UE shall be able to receive PDCCH and PDSCH with new TCI-states after the delay as specified in Section 8.10 in the new BWP

8.6.3 RRC based BWP switch delay

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after the beginning of DL slot $n + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NRSlot length}$, where

DL slot n is the last slot containing the RRC command, and

 $T_{RRCprocess\,ing\,Delay}$ is the length of the RRC procedure delay in millisecond as defined in clause 12 in TS 38.331 [2], and

 $T_{BWPswitchDelayRRC} = [6]ms$ is the time used by the UE to perform BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ on the cell where RRC-based BWP switch occurs.

8.7 Void

8.8 NE-DC: E-UTRAN PSCell Addition and Release Delay

8.8.1 Introduction

This section defines requirements for the delay within which the UE shall be able to configure an E-UTRAN PSCell in NR - E-UTRA dual connectivity. The requirements are applicable to an NR - E-UTRA dual connectivity capable UE.

8.8.2 E-UTRAN PSCell Addition Delay Requirement

The requirements in this section shall apply for the UE which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving E-UTRAN PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards E-UTRAN PSCell no later than in subframe n+ $T_{\text{config_EUTRAN-PSCell}}$:

Where:

```
T_{config\_EUTRAN-PSCell} = 20ms + T_{activation\_time} + 50ms + T_{PCell\_DU} + T_{E-UTRAN-PSCell\_DU}
```

 $T_{activation_time}$ is the E-UTRAN PSCell activation delay. If the E-UTRAN PSCell is known, then $T_{activation_time}$ is 20ms. If the E-UTRAN PSCell is unknown, then $T_{activation_time}$ is 30ms provided the E-UTRAN PSCell can be successfully detected on the first attempt.

 T_{PCell_DU} is the delay uncertainty due to PCell PRACH preamble transmission. T_{PCell_DU} is up to 20ms if E-UTRAN PSCell activation is interrupted by a PCell PRACH preamble transmission, otherwise it is 0.

 $T_{\text{E-UTRAN-PSCell_DU}}$ is the delay uncertainty in acquiring the first available PRACH occasion in the E-UTRAN PSCell. $T_{\text{E-UTRAN-PSCell_DU}}$ is up to 30ms.

E-UTRAN PSCell is known if it has been meeting the following conditions:

During the last [5] seconds before the reception of the E-UTRAN PSCell configuration command:

- the UE has sent a valid measurement report for the E-UTRAN PSCell being configured and
- the E-UTRAN PSCell being configured remains detectable according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15],
- E-UTRAN PSCell being configured also remains detectable during the E-UTRAN PSCell configuration delay according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15].

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.8.3 E-UTRAN PSCell Release Delay Requirement

The requirements in this section shall apply for a UE which is configured with PCell and E-UTRAN PSCell, and may also be configured with one or more SCells and/or E-UTRAN SCells.

Upon receiving E-UTRAN PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe n+20.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9 NR-DC: PSCell Addition and Release Delay

8.9.1 Introduction

This section defines requirements for the delay within which the UE shall be able to configure an PSCell in NR dual connectivity. The requirements are applicable to an NR dual connectivity capable UE.

8.9.2 PSCell Addition Delay Requirement

The requirements in this section shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in subframe $n + T_{\text{config PSCell}}$:

Where:

$$T_{config}$$
 PSCell = T_{RRC} delay + $T_{processing}$ + T_{search} + T_{Δ} + T_{PSCell} DU + 2 ms

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

T_{processing} is the SW processing time needed by UE, including RF warm up period. T_{processing} = 40 ms.

 T_{search} is the time for AGC settling and PSS/SSS detection. If the target cell is known, $T_{search} = 0$ ms. If the target cell is unknown, provided that the side condition $\hat{E}_{s}/Iot \ge [-2]dB$ is fulfilled, $T_{search} = 24*$ Trs ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = 1*Trs$ ms for a known and for an unknown PSCell.

 T_{PSCell_DU} is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. T_{PSCell_DU} is up to the summation of SSB to PRACH occasion associated period and 10 ms. SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this section is applied with Trs = [5] ms and under the condition that the SSB transmission periodicity is [5] ms.

In FR1 and FR2, the NR PSCell is known if it has been meeting the following conditions:

During the last [5] seconds before the reception of the NR PSCell configuration command:

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

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9.3 PSCell Release Delay Requirement

The requirements in this section shall apply for a UE which is configured with PCell and one PSCell.

Upon receiving PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe $n+T_{RRC\ delay}$:

Where

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.10 Active TCI state switching delay

8.10.1 Introduction

The requirements in this section apply for a UE configured with one or more TCI state configurations on serving cell in MR-DC or standalone NR. UE shall complete the switch of active TCI state within the delay defined in this section.

8.10.2 Known conditions for TCI state

The TCI state is known if it has been meeting the following conditions:

- TCI state switch command is received within [1280] ms of the last transmission of the RS resource for beam reporting or measurement for the target TCI state
- The UE has sent at least 1 measurement report for the target TCI state
- The TCI state remain detectable during the TCI state switching period
- The SSB associated with the TCI state remain detectable during the TCI switching period
 - SNR of the TCI state is \geq -3dB

Otherwise, the TCI state is unknown.

8.10.3 MAC-CE based TCI state switch delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ T_{HARQ} +3 ms + TO_k *($T_{first-SSB}$ + $T_{SSB-proc}$). The UE shall be able to receive on the old TCI state until slot n+ T_{HARQ} +3 ms + TO_k *($T_{first-SSB}$).

Where T_{HARQ} is the timing between DL data transmission and acknowledgement as specified in TS 38.321 [7];

T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE;

```
T_{SSB-proc} = 2 \text{ ms};
```

 $TO_k = 1$ if target TCI state is not in the active TCI state list for PDSCH, 0 otherwise.

If the target TCI state is unknown, upon receiving PDSCH carrying MAC-CE activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ T_{HARQ} +3 ms + $T_{L1-RSRP}$ + T_{Ouk} *($T_{first-SSB}$ + $T_{SSB-proc}$). The UE shall be able to receive on the old TCI state until slot n+ T_{HARQ} +3 ms+ $T_{L1-RSRP}$ + T_{Ouk} *($T_{first-SSB}$).

Where $T_{L1\text{-RSRP}}$ is the time for L1-RSRP measurement for Rx beam refinement, defined as

- T_{L1-RSPR_Measurement_Period_SSB} for SSB as specified in clause 9.5.4.1,
 - with the assumption of M=1
 - with $T_{Report} = 0$
- TL1-RSRP_Measurement_Period_CSI-RS for CSI-RS as specified in clause 9.5.4.2
 - with the assumption of M=1 for periodic CSI-RS
 - for aperiodic CSI-RS if number of resources in resource set at least equal to MaxNumberRxBeam
 - with $T_{Report} = 0$

TOuk = 1 for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement

 $T_{L1\text{-RSRP_Measurement_Period_SSB}} = 0$ for SSB in FR2 and $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}} = 0$ for CSI-RS in FR2, provided that the TCI state switching involves QCL-TypeA, QCL-TypeB or CQL-TypeC only.

During MAC CE based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.4 DCI based TCI switch delay

If the target TCI state is known, when a UE is configured with the higher layer parameter *tci-PresentInDCI* which is set as 'enabled' for the CORESET scheduling the PDSCH at slot n, UE shall be able to receive PDSCH or transmit PUSCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+*timeDurationForQCL*, where, *timeDurationForQCL* is the time required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [26], the value of *timeDurationForQCL* is defined in TS 38.306 [14].

The known condition for TCI state defined in clause 8.10.2 is applied.

During DCI based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.5 RRC based TCl state delay

If the target TCI state is known, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ $T_{RRC_processing} + TO_k*(T_{first-SSB} + T_{SSB-proc})$. Where $T_{RRC_processing}$ is the RRC processing delay, $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are as defined in clause 8.10.3. The UE is not required to receive PDCCH/PDSCH or transmit PUCCH/PUSCH until the end of switching period.

If the target TCI state is unknown, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs no later than at slot n+ $T_{RRC_processing}$ + $T_{L1-RSRP}$ + TO_{uk} *($T_{first-SSB}$ + $T_{SSB-proc}$). Where $T_{RRC_processing}$ is the RRC processing delay, $T_{first-SSB}$ and TO_{uk} are as defined in clause 8.10.3. The UE is not required to receive PDCCH/PDSCH or transmit PUCCH/PUSCH until the end of switching period.

During RRC based TCI state switch the UE is allowed an interruption due to one shot timing adjustment on the serving or any activated serving cells as defined in clause 8.2.

8.10.6 Active TCI state list update delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE active TCI state list update at slot n, UE shall be able to receive PDCCH to schedule PDSCH with the new target TCI state no later than slot n+ T_{HARQ} +3ms + $TO_k*(T_{first-SSB} + T_{SSB-proc})$. Where T_{HARQ} , $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are as defined in clause 8.10.3.

8.11 NR PSCell Change

The purpose of NR PSCell change procedure is to change the NR PSCell to another NR cell. The requirements in this clause are applicable to EN-DC and NR-DC. The requirements for PSCell Addition delay in clause 8.9.2 shall apply.

9 Measurement Procedure

9.1 General measurement requirement

9.1.1 Introduction

This clause contains general requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are split in intra-frequency, inter-frequency, inter-RAT E-UTRAN FDD, inter-RAT E-UTRAN TDD, and L1-RSRP measurements requirements. These measurements may be used by the NG-RAN. The measurement quantities are defined in TS38.215 [4], the measurement model is defined in TS38.300 [10], TS37.340 [17] and measurement accuracies are specified in clause 10. Control of measurement reporting is specified in TS 36.331 [16].

In the requirements of clause 9, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2, respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following 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 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 E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].

During the per-FR measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells in the corresponding frequency range for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells in the corresponding frequency range for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

Measurement Gap **Gap Pattern** Measurement ld Length (MGL, ms) **Gap Repetition** Period (MGRP, ms) 5.5 5.5 5.5 5.5 3.5 3.5 3.5 3.5 1.5 1.5 1.5 1.5

Table 9.1.2-1: Gap Pattern Configurations

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
	E-UTRA + FR1, or	non-NR RAT Note1,2	0,1,2,3
Per-UE	E-UTRA + FR2, or	FR1 and/or FR2	0-11
measurement	E-UTRA + FR1 +	non-NR RAT ^{Note1,2}	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2	and FR1 and/or	
		FR2	

	E-UTRA and, FR1 if configured	non-NR RAT Note1,2	0,1,2,3
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR2 only	No gap
	FR2 if configured		12-23
Per FR measurement	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23

Note: In E-UTRA-NR dual connectivity mode, if GSM or UTRA TDD or UTRA FDD inter-RAT frequency layer is configured to be monitored, only measurement gap pattern #0 and #1 can be used for per-FR gap in E-UTRA and FR1 if configured, or for per-UE gap.

NOTE 1: In E-UTRA-NR dual connectivity mode, non-NR RAT includes E-UTRA, UTRA and/or GSM.

In NR-E-UTRA dual connectivity mode, non-NR RAT means E-UTRA.

NOTE 2: Void

NOTE 3: When E-UTRA inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.

In E-UTRA-NR dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

In NR-E-UTRA dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR2.

In NR-NR dual connectivity mode,

- If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest SCG subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

T_{MG} is the MG timing advance value provided in *mgta* according to [2].

In determining the measurement gap starting point, UE shall use the DL timing of the latest E-UTRA or NR subframe occurring immediately before the configured measurement gap among E-UTRA or NR serving cells.

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

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

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;
- If MN indicates UE that the measurement gap from MN applies to only LTE/FR1 serving cell(s),
 - UE fulfils the measurement requirements for FR1/LTE measurement objects based on the configured measurement gap pattern;
 - UE fulfils the requirements for FR2 measurement objects based on effective MGRP=20ms;

For per-FR measurement gap capable configured with E-UTRA-NR dual connectivity, NR-E-UTRA dual connectivity or NR-NR dual connectivity, when serving cells are in E-UTRA, FR1 and FR2, or in E-UTRA and FR2, or in FR1 and FR2, measurement objects are in both E-UTRA /FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN.

Table 9.1.2-3: Applicability for Gap Pattern Configurations supported by the UE with NR standalone operation (with single carrier, NR CA and NR-DC configuration)

Measurement gap pattern configuration	Serving cell	Measurement Purpose NOTE 2	Applicable Gap Pattern Id
		E-UTRA only ^{NOTE3}	0,1,2,3
	FR1 NOTE5, or	FR1 and/or FR2	0-11
	FR1 + FR2	E-UTRAN and	0, 1, 2, 3, 4, 6, 7, 8,10
5 115		FR1 and/or FR2	
Per-UE		E-UTRA only NOTE3	0,1,2,3
measurement		FR1 only	0-11
gap		FR1 and FR2	0-11
	FR2 NOTE5	E-UTRAN and FR1 and/or FR2 NOTE3	0, 1, 2, 3, 4, 6, 7, 8,10
		FR2 only	12-23
Per FR	FR1 if configured	E-UTRA only NOTE3	0,1,2,3
measurement	FR2 if configured		No gap
gap	FR1 if configured	FR1 only	0-11

FR2 if configured		No gap
FR1 if configured	FR2 only	No gap
FR2 if configured		12-23
FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
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: Void

NOTE4: If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among all serving cells subframes. If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR1.

If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR2.

 T_{MG} is the MG timing advance value provided in *mgta* according to [2]. In determining the measurement gap starting point, UE shall use the DL timing of the latest subframe occurring immediately before the configured measurement gap among serving cells.

NOTE 5: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), for per-FR gap based measurement, when there is no serving cell in a particular FR, where measurement objects are configured, regardless if explicit per-FR measurement gap is configured in this FR, the effective MGRP in this FR is used to determine requirements;

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

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), when serving cells are in FR1 or FR2, measurement objects are in both E-UTRA /FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;

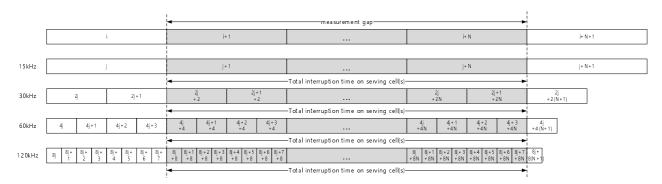
If measurement gap is configured in one FR but measurement object is not configured in the FR, the scheduling opportunity in the FR depends on the configured measurement gap pattern.

For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in SCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.

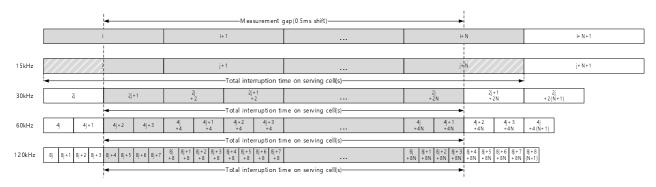
For NR standalone operation (with single carrier, NR CA and NR-DC configuration), if UE is not capable of per-FR-gap, total interruption time on a serving cell during MGL is defined when MGL(N) = 6ms, 5.5ms, 4ms, 3.5ms, 3ms, and

1.5ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell

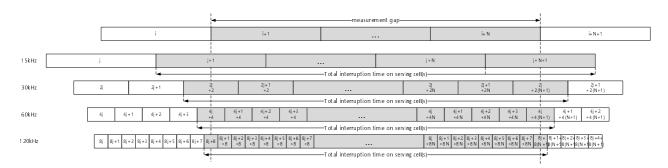
For NR-E-UTRA dual connectivity, if UE is not capable of per-FR-gap, total interruption time on MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in MCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms, given that the reference time for per-FR gap in FR2 is based on an FR2 serving cell.



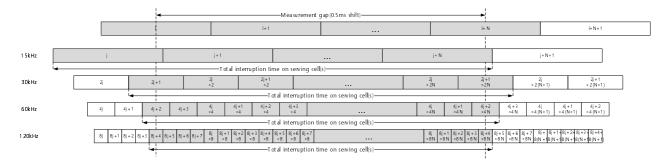
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



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



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

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC

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

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells						
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms	
	MGL=6ms MGL=4ms MGL=3ms MGL=6ms MGL=4ms M					MGL=3ms	
15	6	4	3	7 ^{Note3}	5 ^{Note3}	4 ^{Note3}	
30	12	8	6	12	8	6	
60	24	16	12	24	16	12	
120	48 32 24 48 32 24						
NOTE	NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on						
	MCG is MGL subframes when MG timing advance of 0ms is applied, and						
	(MGL+1) subframes when MG timing advance of 0.5ms is applied.						

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

NOTE 3: Non-overlapped half-slots occur before and after the measurement gap.

Whether a Rel-15 UE can receive and/or transmit in those half-slots is up to UE implementation.

Table 9.1.2-4a: Total number of interrupted slots on serving cells during MGL for Asynchronous EN-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR SCS	Total number of interrupted slots on serving cells When MG timing advance of 0ms is When MG timing advance of 0.5ms					
(kHz)	applied				is applied	
	MGL=6ms MGL=4ms MGL=3ms			MGL=6ms	MGL=4ms	MGL=3ms
15	7	5	4	7	5	4
30	13	9	7	13	9	7
60	25	17	13	25	17	13
120	49	33	25	49	33	25

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

In case that UE capable of per-FR measurement gap is configured with per-FR measurement gap for FR2 serving cells, total number of interrupted slots on FR2 serving cells during MGL is listed in Table 9.1.2-4b.

Table 9.1.2-4b: Total number of interrupted slots on FR2 serving cells during MGL for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR2

NR	Total number of interrupted slots on FR2 serving cells						
SCS (kHz)	When MG timing advance of 0ms is applied			When MG timing advance of 0.25ms is applied			
	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms	
60	22	14	6	22	14	6	
120	44	28	12	44	28	12	

It is up to UE implementation whether or not the UE is able to conduct transmission in the following slot(s),

- when MGTA is not applied, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap
- when MGTA is applied and the SCS of the UL carrier is other than 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap
- when MGTA is applied and the SCS of the UL carrier is 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after the slot partially overlapped with measurement gap

where UL slot denotes that all the symbols in the slot are uplink symbols, and L=1 if $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$ for the UL transmission is less than the length of one slot; L=2 otherwise.

Note: Network is supposed to take into account the possible difference between the estimated TA at network and actual TA at UE when scheduling UE in the above slot(s).

Table 9.1.2-5: (Void)

9.1.2.1 EN-DC: Measurement Gap Sharing

For E-UTRA-NR dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers and inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2][16] and the value of X is defined as in Table 9.1.2.1-1, and

- $K_{intra} = 1 / X * 100$,
- $K_{inter} = 1 / (100 X) * 100$,

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.1.

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

measGapSharingScheme		Value of X (%)	
'00'		Equal splitting	
'01'		25	
'10'		50	
'11'		75	
Note:	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1a SA: Measurement Gap Sharing

For NR standalone UE without NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2] and the value of X is defined as in Table 9.1.2.1a-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.2.

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

measGapSharingScheme		Value of X (%)	
'00'		Equal splitting	
'01'		25	
'10'		50	
'11'		75	
Note:	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1b NE-DC: Measurement Gap Sharing

For NR-E-UTRA dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is

configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2][16] and the value of X is defined as in Table 9.1.2.1b-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.x.

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

measGapSharingScheme	Value of X (%)		
'00'	Equal splitting		
'01'	25		
'10'	50		
'11'	75		
which measureme the table <i>to be ap</i> <i>MeasGapSharing</i>	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1c NR-DC: Measurement Gap Sharing

For UE with NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2] and the value of X is defined as in Table 9.1.2.1c-1, and

- $K_{intra} = 1 / X * 100$,
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.x.

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

measGapSharingConfig	Value of X (%)		
'00'	Equal splitting		
'01'	25		
'10'	50		
'11'	75		
which measuren the table <i>to be a</i> <i>MeasGapSharin</i>	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.3 UE Measurement capability

9.1.3.1 EN-DC: Monitoring of multiple layers using gaps

The requirements in this section are applicable for UE capable of and configured with the EN-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN, inter-RAT NR, GSM, UTRA FDD and UTRA TDD carriers as configured by E-UTRA PCell, and inter-frequency NR carriers as configured by PSCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, etc.) of detected cells on all the layers.

For UE configured with the EN-DC operation, the effective total number of frequencies excluding the frequencies of the PSCell, SCells, E-UTRA PCell, and E-UTRA SCells being monitored is $N_{freq, EN-DC}$, which is defined as:

 $N_{\text{freq, EN-DC}} = N_{\text{freq, EN-DC, NR}} + N_{\text{freq, EN-DC, E-UTRA}} + N_{\text{freq, EN-DC, UTRA}} + M_{\text{EN-DC, GSM}}$

where

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

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

where

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

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

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

 $M_{EN\text{-}DC, GSM}$ is an integer which is a function of the number of GSM inter-RAT carriers as configured by E-UTRA PCell on which measurements are being performed. $M_{EN\text{-}DC, GSM}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{EN\text{-}DC, GSM}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{EN\text{-}DC, GSM}$ is equal to ceil($N_{carriers,GSM}$ /20) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

9.1.3.1a SA: Monitoring of multiple layers using gaps

The requirements in this section are applicable for UE configured with SA NR operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) is configured by PCell, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRA

For UE configured with the NR SA operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{freq, SA}$, which is defined as:

 $N_{\text{freq, SA}} = N_{\text{freq, SA, NR}} + N_{\text{freq, SA, E-UTRA}}$

where

N_{freq, SA, E-UTRA} is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22],

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

9.1.3.1b NE-DC: Monitoring of multiple layers using gaps

The requirements in this section are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by E-UTRA PSCell, inter-RAT E-UTRAN carriers as configured by PCell, and inter-frequency NR carriers as configured by PCell using gaps (or without using gaps provided the UE supports such capability) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, and E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NE-DC operation, the effective total number of frequencies excluding the frequencies of the PCell, SCells, E-UTRA PSCell, and E-UTRA SCells being monitored is N_{freq, NE-DC}, which is defined as:

 $N_{\text{freq, NE-DC}} = N_{\text{freq, NE-DC, NR}} + N_{\text{freq, NE-DC, E-UTRA}}$

where

N_{freq, NE-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell,

 $N_{\text{freq, NE-DC, E-UTRA}} \leq N_{\text{freq, NE-DC, E-UTRA, inter-RAT}} + N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$

where

N_{freq, NE-DC, E-UTRA, inter-RAT} is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by PCell or via LPP [22],

N_{freq, NE-DC, E-UTRA, inter-freq} is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by E-UTRA PSCell [15] or via LPP [22].

9.1.3.1c NR-DC: Monitoring of multiple layers using gaps

The requirements in this section are applicable for UE configured with NR-DC operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) as configured by PCell, and inter-frequency NR carriers as configured by PSCell is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR-DC operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{freq, NR-DC}$, which is defined as:

 $N_{\text{freq, NR-DC}} = N_{\text{freq, NR-DC, NR}} + N_{\text{freq, NR-DC, E-UTRA}}$

where

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

N_{freq, NR-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell and PSCell.

9.1.3.2 EN-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with EN-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PScell, and
- Depending on UE capability, 7 NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD and GSM (one GSM layer corresponds to 32 carriers) layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), comprising of any above defined combination of NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell and NR inter-frequency carriers configured by PSCell.

When the E-UTRA PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in synchronous intra-band EN-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

Note 1: The E-UTRA-NR dual connectivity capable UE configured with PSCell shall fulfil the requirements defined in only one of clause 9.1.3.2 and clause 8.1.2.1.1b.1 of TS 36.133 [15].

9.1.3.2a SA: Maximum allowed layers for multiple monitoring

If a UE is configured with SA NR operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least [13] effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers.

9.1.3.2b NE-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NE-DC operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA FDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 6 effective E-UTRA carrier frequency layers, excluding E-UTRA serving carrier(s), comprising of any above defined combination of E-UTRA inter-RAT carriers excluding E-UTRA serving carrier(s) configured by PCell and E-UTRA inter-frequency carriers configured by E-UTRA PSCell.

9.1.3.2c NR-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NR-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least [13] effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least [7] effective NR carrier frequency layers excluding NR serving carrier(s), which are configured by PCell and PSCell.

When PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in NR-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

9.1.4 Capabilities for Support of Event Triggering and Reporting Criteria

9.1.4.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 9.1.4.2, the UE shall meet all other performance requirements defined in clause 9 and clause 10.

The UE can be requested to make measurements under different measurement identities defined in TS 38.331 [2]. Each measurement identity corresponds to either event based reporting, periodic reporting, or no reporting. In case of event based reporting, each measurement identity is associated with an event triggering criterion. In case of periodic reporting, a measurement identity is associated with one periodic reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event triggering, periodic, and no reporting criteria the UE may be requested to track in parallel.

9.1.4.2 Requirements

In this 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: $E_{cat,EN-DC,NR} + E_{cat,EN-DC,E-UTRA}$, where

 $E_{cat,EN-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria applicable for UE configured with EN-DC according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PSCell and SCells carrier frequencies,

 $E_{cat,EN-DC,E-UTRA}$ is the total number of E-UTRA reporting criteria configured by E-UTRA PCell except PSCell and SCells carrier frequencies, as specified in TS 36.133 [15] for UE configured with EN-DC.

- For UE configured with NE-DC: $E_{cat,NE-DC,NR} + E_{cat,NE-DC,E-UTRA}$, where

 $E_{cat,NE-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell and SCells carrier frequencies,

$$E_{cat,NE-DC,E-UTRA} = E_{cat,NE-DC,E-UTRA,inter-RAT} + E_{cat,NE-DC,E-UTRA,intra-RAT}$$
, where

 $E_{cat,NE-DC,E-UTRA,inter-RAT}$ is the total number of inter-RAT E-UTRA reporting criteria configured by PCell except E-UTRA PSCell and E-UTRA SCells carrier frequencies, according to Table 9.1.4.2-1,

 $E_{cat,NE-DC,E-UTRA,intra-RAT}$ is the total number of E-UTRA reporting criteria including E-UTRA PSCell and E-UTRA SCells carrier frequencies as specified in TS 36.133 [15] for UE configured with NE-DC.

- For UE configured with SA operation mode: $E_{cat,SA,NR} + E_{cat,SA,E-UTRA}$, where

 $E_{cat,SA,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

 $E_{cat.SA.E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

- For UE configured with NR-DC: $E_{cat.NR-DC.NR} + E_{cat.NR-DC.E-UTRA}$, where

 $E_{cat,NR-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, PSCell and SCells carrier frequencies,

 $E_{cat,NR-DC,E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

Table 9.1.4.2-1: Requirements for reporting criteria per measurement category

Measurement category	E _{cat}	Note
Intra-frequency Note 1,2,3,4,5	9	Events for any one or a combination of intra- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN intra-frequency cells
Inter-frequency Note 2,3,4,5	10	Events for any one or a combination of inter- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN inter-frequency cells
Inter-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5	10	Only applicable for UE with this (inter-RAT) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSTD Note 2,4,5	1	Inter-RAT RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 inter-RAT cell measurements. Only applicable for UE with this (inter-RAT RSTD via LPP [22]) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSRP and RSRQ measurements for E-CID Note 2,4,5	1	Inter-RAT RSRP and RSRQ measurements for E-CID reported to E-SMLC via LPP [22]. One report capable of at least in total 10 inter-RAT RSRP and RSRQ measurements. Applicable to UE capable of reporting inter-RAT RSRP and RSRQ to E-SMLC via LPP. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.

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

NOTE 2: Applicable for UE configured with SA NR operation mode.

NOTE 3: Applicable for UE configured with EN-DC operation mode.

NOTE 4: Applicable for UE configured with NE-DC operation mode.

NOTE 5: Applicable for UE configured with NR-DC operation mode.

9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.3 and 9.4 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSF_{outside_gap,i} and CSSF_{within_gap,i}, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

9.1.5.1 Monitoring of multiple layers outside gaps

The carrier-specific scaling factor $CSSF_{outside_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement with no measurement gap in clause 9.2.5, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with no measurement gap in clause 9.2.5, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.

UE is expected to conduct the measurement of this measurement object i only outside the measurement gaps.

If the higher layer signaling in TS 38.331 [2] signaling of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{outside_gap,i} and requirements derivied from CSSF_{outside_gap,i} are not specified.

The UE cell identification and measurement periods derived based on $CSSF_{outside_gap,i}$ in clauses 9.2.5.1, 9.2.5.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{measure}$ specified in clause 9.3.8 when no measurement gaps are provided.

9.1.5.1.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with the E-UTRA-NR dual connectivity operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.1-1.

Table 9.1.5.1.1-1: CSSF_{outside_gap,i} scaling factor for EN-DC mode

Scenario	CSSF _{outside_ga} p,i for FR1 PSCC	CSSFoutside_gap ,i for FR1 SCC	CSSF _{outside_gap,} i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required Note 2	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
EN-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
EN-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCells
EN-DC with FR1 +FR2 CA (FR1 PSCell) Note	1	2x(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. Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

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

For UE in SA operation mode, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.2-1, which shall also be applied for a UE configured with NE-DC operation.

Table 9.1.5.1.2-1: CSSF_{outside_gap,i} scaling factor for SA mode

Scenario	CSSFoutside_gap ,i for FR1 PCC	CSSFoutside_gap ,i for FR1 SCC	CSSF _{outside_ga} _{p,i} for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2	2x(Number of configured SCell(s)-1)

Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA. Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

9.1.5.1.3 NR-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NR-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.3-1.

Table 9.1.5.1.3-1: CSSF_{outside_gap,i} scaling factor for NR-DC mode

Scenario	CSSF _{outside_gap} ,i for FR1 PCC	CSSF _{outside_gap,i} for FR1 SCC	CSSFoutside_gap,i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 + FR2 NR- DC (FR1 PCell and FR2 PScell)	1	2×(Number of configured SCell(s))	2	2×(Number of configured SCell(s))
Note 1: NR-DC in FR2.	n Rel-15 only inclu	des the scenarios wh	ere all serving cells ir	n MCG in FR1 and all serving cells in SCG

9.1.5.1.4 NE-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NE-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.4-1.

Table 9.1.5.1.4-1: CSSF_{outside_gap,i} scaling factor for NE-DC mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} , 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
NE-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
NE-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
NE-DC with FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2	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. Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor $CSSF_{within_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with measurement gap in clause 9.2.6.
- Inter-frequency measurement in clause 9.3
- Inter-RAT measurement in clause 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 gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{within_gap,i} and requirements derivied from CSSF_{outside_gap,i} are not specified.

9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

Editor's note: The scaling value CSSF_{within_gap,i} below has been derived without considering GSM inter-RAT carriers.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this section.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR carrier is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object is a candidate to be measured in all measurement gaps.

 R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

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 intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.

 $M_{inter,i,j}$: Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects and GSM inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{inter,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within gap,i}= max(ceil(R_i×M_{tot,i,j})), where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is an intra-frequency measurement object, $CSSF_{within_gap,i}$ is the maximum among
 - ceil($R_i \times K_{intra} \times M_{intra,i,j}$) in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object i is an inter-frequency or inter-RAT measurement object, $CSSF_{within_gap,i}$ is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{inter,i,j})$ in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - ceil($R_i \times M_{inter,i,j}$) in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1

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 or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR carrier is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object is a candidate to be measured in all measurement gaps.

 R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

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 i:

 $M_{intra,i,j}$: Number of intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.

 $M_{inter,i,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{inter,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, $CSSF_{within_gap,i} = max(ceil(R_i \times M_{tot,i,j}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object *i* is an intra-frequency measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{intra,i,j})$ in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{inter,i,j})$ in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1

 $CSSF_{within_gap,k}=1$ during $T_{Detect,\ E-UTRAN\ FDD}$ specified in clause 9.4.4.1.2.2 and $T_{Detect,\ E-UTRAN\ TDD}$ specified in section 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA

OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on CSSF_{within_gap,i} in clauses 9.2.5.1, 9.2.5.2, 9.2.6.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with T_{Detect, E-UTRAN FDD} and T_{Detect, E-UTRAN TDD}.

9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this section.

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR carrier is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object is a candidate to be measured in all measurement gaps.

 R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

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*:

If the number of configured interfrequency and interRAT measurement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intrafrequency measurement objects belong to group A

Interfrequency and interRAT measurement objects belong to group B

 $M_{groupA,i,j}$:: Sum of the number of FR1 intrafrequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intrafrequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupB,i,j}$: 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 $M_{groupB,i,j}$ equals 0.

If the number of configured interfrequency and interRAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intrafrequency measurement objects belong to group A

FR2 intrafrequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intrafrequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{\text{groupBi,j}}$: The number of FR2 intrafrequency measurement objects $M_{\text{intra-FR2,i,j}}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{groupB,i,j}}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$: Total number of intrafrequency, group A and group B 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 group A measurement object, CSSF_{within gap.i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{groupA,i,j}$) in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object *i* is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1

9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within gap,i} and is derived as described in this section.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and inter-frequency/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 duration is fully covered by the MGL excluding RF switching time. For intrafrequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An interRAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object is a candidate to be measured in all measurement gaps.

 R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

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*:

If the number of configured interfrequency and interRAT measurement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intrafrequency measurement objects belong to group A

Interfrequency and interRAT measurement objects belong to group B

 $M_{groupA,i,j}$: Sum of the number of FR1 intrafrequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intrafrequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupB,i,j}$: 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 $M_{groupB,i,j}$ equals 0.

If the number of configured interfrequency and interRAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intrafrequency measurement objects belong to group A

FR2 intrafrequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intrafrequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: The number of FR2 intrafrequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

 $M_{\text{tot},i,j} = M_{\text{groupA},i,j} + M_{\text{groupB},i,j}$: Total number of group A and group B 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×M_{tot,i,j})), where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is an group A measurement object, CSSF_{within_gap.i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{groupA,i,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object *i* is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{groupA,i,j}$) in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupB,i,j}=0$, 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 clause 9.1.5 that applies to the other impacted measurement objects will also apply based on the longer measurement or cell identification delay before or after the transition.

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, the cell identification and measurement period requirements apply based on the longer delay before or after the transition.

Subsequent to this measurement period, the cell identification and measurement period requirements on each measurement object are corresponding to the second mode after transition.

9.2 NR intra-frequency measurements

9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

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

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE, or
- the active downlink BWP is initial BWP[3].

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB which start earlier than the gap starting time + switching time, nor detect SSB which end later than the gap end – switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

9.2.2 Requirements applicability

The requirements in clause 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Es/Iot according to Annex B.2.2 for a corresponding Band.

9.2.3 Number of cells and number of SSB

9.2.3.1 Requirements for FR1

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements forat least:

- 8 identified cells, and
- 14 SSBs with different SSB index and/or PCI on the intra-frequency layer, where the number of SSBs in the serving cell (except for the SCell) is not smaller than the number of configured RLM-RS SSB resources.

9.2.3.2 Requirements for FR2

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 6 identfied cells, and
- 24 SSBs with different SSB index and/or PCI,

where the single serving carrier shall be:

- PCC when UE is configured with SA NR operation mode with PCC in the band; or
- PSCC when UE is configured with EN-DC with PSCC in the band; or
- One of the SCCs on which UE is configured to report SSB based measurements when neither PCC nor PSCC is
 in the same band, so that the selected SCC shall be an SCC where the UE is configured with SS-RSRP
 measurement reporting if such SCC exists, otherwise the selected SCC is up to the UE

The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other serving carrier(s) in the same band.

9.2.4 Measurement Reporting Requirements

9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 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 clauses 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 clauses 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 is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{identify\ intra\ with\ index}$ or T $_{identify\ intra\ without\ index}$ defined in clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSBs measured from the Cell being configured remains detectable during the time period $T_{identify_intra_without_index}$ or $T_{identify_intra_with_index}$ as defined in clause 9.2.5.1 or clause 9.2.6.2. If a cell which has been detectable at least for the time period $T_{identify_intra_without_index}$ 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 with the same spatial reception parameter and triggers an event, the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_intra}$ 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 Intrafreguency cell identification

The UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(*reportQuantityRsIndexes* or *maxNrofRSIndexesToReport* is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra

frequency cell within $T_{identify_intra_with_index}$. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within $T_{identify_intra_without_index}$. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra}) \ ms$$

$$T_{identify_intra_with_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}) \ ms$$

Where:

T_{PSS/SSS_sync_intra}: it is the time period used in PSS/SSS detection given in table 9.2.5.1-1, 9.2.5.1-2, 9.2.5.1-4 (deactivated Scell) or 9.2.5.1-5 (deactivated SCell)

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.5.1-3 or 9.2.5.1-6 (deactivated SCell)

 $T_{SSB_measurement_period_intra}$: equal to a measurement period of SSB based measurement given in table 9.2.5.2-1, table 9.2.5.2-2 table 9.2.5.2-3 (deactivated Scell) or 9.2.5.2-4(deactivated SCell)

CSSF_{intra}: it is a carrier specific scaling factor and is determined

- according to CSSF_{outside_gap,i} in clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intrafrequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intrafrequency SMTC is fully overlapping with measurement gaps.
 - if the high layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intrafrequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss_sync_w/o_gaps}$: For a UE supporting FR2 power class 1, M_{pss/sss_sync} =40. For a UE supporting power class 2, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_w/o_gaps}$ =24.

 $M_{meas_period_w/o_gaps}$: For a UE supporting power class 1, $M_{meas_period_w/o_gaps}$ =40. For a UE supporting FR2 power class 2, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_w/o_gaps}$ =24.

When intrafrequency SMTC is fully non overlapping with measurement gaps or intrafrequency SMTC is fully overlapping with MGs, Kp=1

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

If the higher layer signaling in TS38.331 [2] signaling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$

For FR2,

 $K_{layer1_measurement}\!\!=\!\!1,$

if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;

 $K_{layer1_measurement}=1.5$, otherwise.

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra	
No DRX	max(600ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x	
	CSSF _{intra}	
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5 x K _p) x max(SMTC	
•	period,DRX cycle)) x CSSF _{intra}	
DRX cycle>320ms	ceil(5] x K _p) x DRX cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is		
the one used by the cell being identified		

Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

DRX cycle	T _{PSS/SSS_sync_intra}	
No DRX	max(600ms, ceil(M _{pss/sss_sync_w/o_gaps} x K _p x	
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}	
DRX cycle≤ 320ms	max(600ms, ceil(1.5 x M _{pss/sss_sync_w/o_gaps} x K _p x	
	$K_{layer1_measurement}$) x max(SMTC period,DRX cycle)) x	
	CSSF _{intra}	
DRX cycle>320ms	ceil(Mpss/sss_sync_w/o_gaps x Kp x Klayer1_measurement) x DRX	
	cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is		
the one used by the cell being identified	ed	

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 CSSFintra	
DRX cycle>320ms	Ceil(3 x K _p) x DRX cycle x CSSF _{intra}	
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is		
the one used by the cell being identified		

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

DRX cycle	Tpss/sss_sync_intra
No DRX	5 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (Frequency range FR2)

DRX cycle	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	T _{SSB_time_index_intra}
No DRX	3 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	3 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	3 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). If the higher layer signaling in TS38.331 [2] 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 TSSB_measurement_period_intra

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.2-1: Measurement period for intrafrequency measurements without gaps(Frequency FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x
	CSSF _{intra}
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5 x K _p) x max(SMTC period,DRX
·	cycle)) x CSSF _{intra}
DRX cycle>320ms	ceil(5 x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.2-2: Measurement period for intrafrequency measurements without gaps(Frequency FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, ceil(M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}
DRX cycle≤ 320ms	max(400ms, ceil(1.5x M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x
	CSSF _{intra}
DRX cycle>320ms	ceil(M _{meas_period_w/o_gaps} xK _p x K _{layer1_measurement}) x DRX
	cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are config	gured for different cells, the SMTC period in the requirement is
the one used by the cell being identified	

Table 9.2.5.2-3: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR1)

DRX cycle	T ssb_measurement_period_intra
No DRX	5 x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	5 x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	5 x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.2-4: Measurement period for intrafrequency measurements without gaps (deactivated SCell) (Frequency range FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	M _{meas_period_w/o_gaps} x measCycleSCell x CSSF _{intra}
DRX cycle ≤ 320ms	M _{meas_period_w/o_gaps} x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	M _{meas_period_w/o_gaps} x max(measCycleSCell, DRX cycle) x CSSF _{intra}

9.2.5.3 Scheduling availability of UE during intra-frequency measurements

UE are required to be capable of measuring without measurement gaps when the SSB is completely contained in the active bandwidth part of the UE. When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols to be measured in the following clauses are the SSB symbols indicated by *SSB-ToMeasure* [2], if it is configured; otherwise, all *L* SSB symbols within SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, the SMTC periodicity follows *smtc2*; Otherwise SMTC periodicity follows *smtc1*.

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRQ measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, the SMTC periodicity follows *smtc2*; Otherwise SMTC periodicity follows *smtc1*.

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

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

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If deriveSSB_IndexFromCell is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer 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 due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling <code>deriveSSB_IndexFromCell</code> is always enabled for FR2) . If the high layer in TS 38.331 [2] signaling of <code>smtc2</code> is configured, the SMTC periodicity follows <code>smtc1</code>.

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

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB_IndexFromCellc* is always enabled for FR2). If the high layer 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 due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

If following conditions are met:

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

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

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

9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer.

9.2.5.4 SFTD Measurements between PCell and PSCell

9.2.5.4.1 Introduction

This clause contains SFTD measurement requirements for UE which supports NR-DC and is configured with a PSCell in RRC_CONNECTED state. The UE shall perform SFTD measurement between PCell and PSCell, and report SFTD result with/without SS-RSRP after the network requests with TBD. The overall delay includes RRC procedure delay to be defined in clause 12 in TS 38.331 [2], and SFTD measurement reporting delay in clause 9.2.5.4.3.

9.2.5.4.2 SFTD Measurement delay

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(200,[5] \text{ x SMTC period})$ ms, where the SMTC period refers to the maximum between the configured SMTC period in PCell and PSCell.

When DRX is used in either of the PCell or the PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in Table 9.2.5.4.2-1.

Table 9.2.5.4.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) Note 3		T _{measure_} SFTD1 (s)
	≤0.04	max(0.2,[5] x SMTC period) (Note2)
0.	04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.3	32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note 1: SMTC period in this table refers to the maximum between the configured SMTC period in PCell and PSCell. Note 2: Number of DRX cycles depends upon the DRX cycle in use DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX		
cycle lengths for PCell and PSCell.		

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NRDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period (T_{measure SFTD2}), and

T_{PSCell_change_NRDC} is the time necessary to change the PSCell; it can be up to [25] ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 10.1.21.

9.2.5.4.3 SFTD Measurement Reporting Delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI_{DCCH}. This measurement reporting delay excludes any delay caused by no UL resources available for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than measurement period defined in clause 9.2.5.4.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.2.6 Intrafrequency measurements with measurement gaps

9.2.6.1 Void

9.2.6.2 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra frequency cell within $T_{identify_intra_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (deriveSSB-IndexFromCell is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within $T_{identify_intra_with_index}$. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within $T_{identify_intra_without_index}$. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} \ ms$$

$$T_{identify_intra_with_index} = T_{PSS/SSS_sync_ntra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}$$

Where:

 T_{PSS/SSS_sync_intra} : it is the time period used in PSS/SSS detection given in table 9.2.6.2-1 or 9.2.6.2-2.

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.6.2-3.

T _{SSB_measurement_period_intra}: equal to a measurement period of SSB based measurement given in table 9.2.6.2-1 or 9.2.6.2-2.

 $CSSF_{intra}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_with_gaps}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_with_gaps}$ =40. For a UE supporting FR2 power class 2, $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting power class 4, $M_{pss/sss_sync_with_gaps}$ =24.

 $M_{meas_period_with_gaps}$: For a UE supporting power class 1, $M_{meas_period_with_gaps}$ =40. For a UE supporting power class 2, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_with_gaps}$ =24.

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

If SCG DRX is in use, intrafrequency cell identification requirements specified in Table 9.2.6.1-1, 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	T _{PSS/SSS_sync_intra}
No DRX	max(600ms, 5 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5) x max(MGRP, SMTC
	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-2: Time period for PSS/SSS detection (Frequency range FR2)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max(600ms, Mpss/sss_sync_with_gaps x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x M _{pss/sss_sync_with_gaps}) x
·	max(MGRP, SMTC period, DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
·	CSSF _{intra}

Table 9.2.6.2-3: Time period for time index detection (Frequency range FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	max(120ms, 3 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(120ms, ceil(1.5x 3) x max(MGRP, SMTC
	period,DRX cycle) x CSSF _{intra})
DRX cycle>320ms	3 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

9.2.6.3 Intrafrequency Measurement Period

The measurement period for FR1 intrafrequency measurements with gaps is as shown in table 9.2.6.3-1.

The measurement period for FR2 intrafrequency measurements with gaps is as shown in table 9.2.6.3-2.

If SCG DRX is in use, intrafrequency measurement period requirements specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.3-1: Measurement period for intrafrequency measurements with gaps(Frequency Range FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, 5 x max(MGRP, SMTC period)) x
	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
	CSSFintra

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 an intra-frequency measurement according to clause 9.2.

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

SSB based measurements are configured along with a measurement timing configuration (SMTC) per carrier, which provides periodicity, duration and offset information on a window of up to 5ms where the measurements on the configured inter-frequency carrier are to be performed. For inter-frequency connected mode measurements, one measurement window periodicity may be configured per inter-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB on an inter-frequency measurement object which 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, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

9.3.2 Requirements applicability

The requirements in clause 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

9.3.2.1 Void

9.3.2.2 Void

9.3.3 Number of cells and number of SSB

9.3.3.1 Requirements for FR1

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 7 SSBs with different SSB index and/or PCI on the inter-frequency layer.

9.3.3.2 Requirements for FR2

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 10 SSBs with different SSB index and/or PCI on the inter-frequency layer, and
- one SSB per identified cell.

9.3.4 Inter frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within $T_{identify_inter_with_ut_index}$.

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

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

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, M_{pss/sss_sync_inter} = 40 samples. For a UE supporting FR2 power class 3, M_{pss/sss_sync_inter} = 40 samples. For a UE supporting FR2 power class 4, M_{pss/sss_sync} = 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, $M_{pss/sss_sync_inter} = 24$ samples. For a UE supporting power class 3, $M_{SSB_index_inter} = 24$ samples. For a UE supporting power class 4, $M_{meas_period_inter} = 24$ 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, M_{pss/sss_sync_inter} =40 samples. For a UE supporting FR2 power class 3, $M_{meas_period_inter}$ =40 samples. For a UE supporting FR2 power class 4, $M_{meas_period_inter}$ = 40 samples.

 $CSSF_{inter}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	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 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	
	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	T _{PSS/SSS_sync_inter}
No DRX	max(600ms, M _{pss/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 DI	RX requirements apply according to the conditions described in clause 3.6.1
NOTE 2: In EN-DC oper	ration, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for
the secondary	cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

Condition NOTE1,2	Tssb_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 DI	RX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC oper	EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are fo	
the secondary	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 CSSFinter	
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	Mssb_index_inter x DRX cycle x CSSFinter	
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1		
NOTE 2: In EN-DC oper	In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for	
the secondary	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 CSSF _{inter}	
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 clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.5-2: Measurement period for inter-frequency measurements with gaps (Frequency FR2)

Condition NOTE1,2	T SSB_measurement_period_inter	
No DRX	max(400ms, M _{meas_period_inter} 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	
	CSSFinter	
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 clause 3.6.1		
NOTE 2: In ENIDC apprecian, the parameters timere and cabaduling requests referred to in clause 2.6.4 are for		

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

9.3.5.1 Void

9.3.5.2 Void

9.3.5.3 Void

9.3.6 NR Inter frequency measurements reporting requirements

9.3.6.1 Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

9.3.6.2 Event-triggered Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.3.6.3.

9.3.6.3 Event-triggered Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. Both $T_{identify_inter_without_index}$ and $T_{identify_inter_with_index}$ are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSB measured from the cell being configured remains detectable during the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4. If a cell which has been detectable at least for the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4 becomes undetectable for a period and then the cell becomes detectable again with the same spatial reception parameter and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_inter}$ defined in clause 9.3.5 provided the timing to that cell has not changed more than \pm 3200 Tc while measurement gap has not been available and the L3 filtering has not been used. When L3 filtering is used an additional delay can be expected.

9.3.7 Void

9.3.8 NR Inter frequency SFTD measurement requirements

9.3.8.1 Introduction

This clause contains requirements for a UE supporting NR inter- frequency SFTD measurement and is applicable in RRC_CONNECTED state. The UE shall, depending on network request, perform inter-frequency SFTD measurement and report SFTD result with or without SS-RSRP. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2] and SFTD measurement reporting delay in clause 9.3.8.3.

UE which fulfils the requirements in clause 9.3.8 is not supposed to fulfil the requirements defined in clause 9.2.5.4.

9.3.8.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this section are applicable under the side condition SCH $\hat{E}s/Iot \ge -3$ dB for the inter-frequency neighbour cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest applicable inter-frequency neighbour cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more strongest cells. The UE may or may not be configured with [cellsForWhichToReportSFTD]. The UE does not expect [cellsForWhichToReportSFTD] to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell regardless of its SSB position in the SMTC period, provided that the carrier frequency where SFTD measurement is configured and the serving carrier(s) form a supported CA or NR-DC band combination of the UE. The SFTD measurement shall be conducted with sustained connection to the PCell and activated SCell(s) in MCG. Depending on capability, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 8.2.2.2.6.

When measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure\ SFTD1}$ as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 14 SMTC periods
 - For carrier frequency in FR2: $T_{\text{measure SFTD1}} = 112 \text{ SMTC periods}$
- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: $T_{measure_SFTD1} = CSSF_{inter} \times 8 \times max(MGRP, SMTC period)$
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 64 × max(MGRP, SMTC period)
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 19 SMTC periods
 - For carrier frequency in FR2: T_{measure_SFTD1} = 152 SMTC periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: $T_{measure\ SFTD1} = CSSF_{inter} \times 13 \times max(MGRP, SMTC\ period)$
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 104 × max(MGRP, SMTC period)

where CSSF_{inter} is a carrier specific scaling factor and is determined according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps.

When DRX is used, the same $T_{measure_SFTD1}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case PCell is changed due to handover, the UE shall terminate the inter-frequency SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfil the requirement in clause 10.1.21.3. The measurement accuracy for additionally reported SS-RSRP shall fulfil the requirement in clauses 10.1.4.1 and 10.1.5.1 for neighbour cell in FR1 and FR2, respectively.

9.3.8.3 SFTD Measurement reporting delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface, excluding the RRC procedure delay defined in TS 38.331 [2]. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of 2 x TTI_{DCCH} resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than T_{measure_SFTD1} defined in clause 9.3.8.2.

9.4 Inter-RAT measurements

9.4.1 Introduction

The requirements in this 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 SA or NR-DC operation mode or configured in NE-DC operation mode by PCell with NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) on E-UTRA non-serving frequency carrier, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements specified in clause 8.19 of TS 36.133 [15] shall apply.

Parameter T_{Inter1} used in inter-RAT requirements in clause 9.4 is specified in Table 9.4.1-1.

Table 9.4.1-1: Minimum available time for inter-RAT measurements

Gap Pattern Id	MeasurementGap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)	Minimum available time for inter- frequency and inter- RAT measurements during 480 ms period (Tinter1, ms)
0	6	40	60
1	6	80	30
2	3	40	24 ^{Note 1}
3	3	80	12 ^{Note 1}
4	6	20	120 Note 1
6	4	20	72 Note 1,3,6
7	4	40	36 Note 1,4,6
8	4	80	18 ^{Note 1,5,6}
10	3	20	48 Note 1
NOTE 1: When determing UE requirements using Tinter1 for gap pattern IDs 2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for gap pattern IDs 2, 4, 6, 7, 10, and Tinter1 = 30 for gap pattern IDs 3 and 8 shall be used. NOTE 2: Measurement gaps pattern configurations applicability is as specified in			

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

A UE configured with gap pattern ID 2, 3 or 10 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 μs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends not later than 500 μs before the end of the measurement gap in case of FDD and not later than 750 μs before the end of measurement gap in case of TDD.

A UE configured with gap pattern ID 6, 7 or 8 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 μs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends no later than 1500 μ s before the end of the measurement gap in case of FDD and no later than 1750 μ s before the end of measurement gap in case of TDD.

9.4.2 NR – E-UTRAN FDD measurements

9.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN FDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.2.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable FDD cell within $T_{Identify,\,E-UTRAN\,FDD}$ according to the following expression:

$$T_{\text{Identify,E-UTRAN FDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Inter1}}} \cdot \text{CSSF}_{\text{interRAT}} \quad ms,$$

where:

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

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measure, E-UTRAN \, FDD}$ 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]
0	480 x CSSF _{interRAT}	6
1 (Note 1)	240 x CSSF _{interRAT}	50
NOTE 1: This co	nfiguration is optional.	

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

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

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN FDD cell within $T_{Identify, E-UTRAN \, FDD}$ specified in Table 9.4.2.3-1.

Table 9.4.2.3-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (S) (DRX cycles)		
	Gap period = 40 ms, 20 ms	Gap period = 80 ms	
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.2.2 apply	clause 9.4.2.2 apply	
0.256	5.12*K (20*CSSFinterRAT)	7.68*K (30*CSSF _{interRAT})	
0.32	6.4*K (20*CSSFinterRAT)	7.68*K (24*CSSF _{interRAT})	
0.32< DRX-cycle ≤	Note1 (20*CSSFinterRAT)	Note1 (20*CSSFinterRAT)	
10.24			
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.2.2.			

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN FDD}$ specified in Table 9.4.2.3-2.

Table 9.4.2.3-2: Requirement to measure E-UTRAN FDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN FDD (S) (DRX cycles)	
≤0.08	Non-DRX requirements in clause 9.4.2.2 apply	
0< DRX-cycle ≤	Note1 (5* CSSF _{interRAT})	
10.24		
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.2.2.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

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

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.4 Measurement reporting requirements

9.4.2.4.1 Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.2.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.2.4.3.

9.4.2.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 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 clauses 9.4.2.2 and 9.4.2.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify, E-UTRAN\,FDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure, E-UTRAN\,FDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.3 NR - E-UTRAN TDD measurements

9.4.3.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSRP, RSRO, and RS-SINR measurements.

In the requirements, an E-UTRAN TDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],

RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.3.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable TDD cell within $T_{Identify, E-UTRAN \, TDD}$ according to the following expression:

- When configuration 0 or configuration 1 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\;TDD} = T_{\rm BasicIdentify} \cdot \frac{_{480}}{_{T_{\rm Inter1}}} \cdot {\rm CSSF}_{\rm interRAT} \hspace{0.5cm} ms,$$

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

$$T_{\text{Identify,E-UTRAN TDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Inter1}}} \cdot \text{CSSF}_{\text{interRAT}} + 240 \cdot \text{CSSF}_{\text{interRAT}}$$
 ms

where:

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

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measure, E-UTRAN \, TDD}$ defined in Table 9.4.3.2-1.

DwPTS Configuration Number of UL/DL sub-Measurement T_{Measure}, E-UTRAN frames per half frame (5 ms) bandwidth TDD [ms] [RB] DL UL Normal Extende CP d CP 0 2 2 6 480 x $19760 \cdot T_{s}$ 20480·T_s $CSSF_{interRAT}$ 1 (Note 1) 50 2 2 240 x $19760 \cdot T_{s}$ $20480 \cdot T_{c}$ $CSSF_{\text{interRAT}}$ 2 6 1 3 $19760 \cdot T_{s}$ 720 x 20480·T CSSFinterRAT 3 (Note 1) 50 1 3 480 x $19760 \cdot T_{c}$ $20480 \cdot T_{c}$ CSSF_{interRAT}

Table 9.4.3.2-1: T_{Measure, E-UTRAN TDD} for different configurations

NOTE 1: This configuration is optional.

NOTE 2: Void

The UE shall be capable of identifying and performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

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

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN TDD cell within T_{Identify, E-UTRAN TDD} specified in Table 9.4.3.3-1.

Table 9.4.3.3-1: Requirement to identify a newly detectable E-UTRAN TDD cell

DRX cycle length (s)	Tidentify, E-UTRAN TDD (s) (DRX cycles)		
	Gap period = 40 ms, 20	Gap period = 80 ms	
	ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.3.2 apply	clause 9.4.3.2 apply	
0.256	5.12*K (20*CSSFinterRAT)	7.68*K (30*CSSFinterRAT)	
0.32	6.4*K (20*CSSFinterRAT)	7.68*K (24*CSSFinterRAT)	
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSFinterRAT)	
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.3.2.			

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN TDD}$ specified in Table 9.4.3.3-2.

Table 9.4.3.3-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN TDD (s) (DRX cycles)	
≤0.08	Non-DRX Requirements in clause 9.4.3.2 apply	
0.128	For configuration 2, non-DRX requirements in	
	clause 9.4.3.2 apply,	
	Otherwise: Note1 (5*CSSF _{interRAT})	
0.128 <drx-cycle≤< td=""><td>Note1 (5*CSSF_{interRAT})</td></drx-cycle≤<>	Note1 (5*CSSF _{interRAT})	
10.24		
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF _{interRAT} is as defined in clause 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 clause 10.2.2.

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

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.4 Measurement reporting requirements

9.4.3.4.1 Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.3.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.3.4.3.

9.4.3.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 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 clauses 9.4.3.2 and 9.4.3.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify,\,E-UTRAN\,TDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure,\,E-UTRAN\,TDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.4 Inter-RAT RSTD measurements

9.4.4.1 NR – E-UTRAN FDD RSTD measurements

9.4.4.1.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSTD measurements requested via LPP [22, 27].

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{\text{RSTD InterRAT E-UTRAN FDD}}$ starts.

9.4.4.1.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT E-UTRAN FDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{RSTD InterRAT, E-UTRAN FDD}$ ms as given below:

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

where

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

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.1.2-1, where each PRS positioning occasion comprises of N_{PRS} (1 \leq N_{PRS} \leq 6) consecutive downlink positioning subframes defined in TS 36.211 [23],

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN FDD carrier frequencies.

Table 9.4.4.1.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$

Positioning subframe	Number of PRS positioning occasions $\it M$	
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 × CSSF _{interRAT}	32 × CSSF _{interRAT}
>160 ms	8 × CSSF _{interRAT}	16 x CSSF _{interRAT}
NOTE 1: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN FDD carrier frequency f2.		
OTE 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-UTRAN FDD carrier frequency f2 respectively.		

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:

 $(PRS \, \hat{\mathbb{E}}_s \, / \, Iot)_{ref} \ge -6 \, dB$ for all Frequency Bands for the reference cell, $(PRS \, \hat{\mathbb{E}}_s \, / \, Iot)_i \ge -13 \, dB$ for all Frequency Bands for neighbour cell i, $(PRS \, \hat{\mathbb{E}}_s \, / \, Iot)_{ref}$ and $(PRS \, \hat{\mathbb{E}}_s \, / \, Iot)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP 1,2_{|dBm} according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

 $PRS\,\hat{E}_s$ / Iot is defined as the ratio of the average received energy per PRS 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 clause 10.2.4.

9.4.4.1.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.1.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

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

where

 $T_{Detect, E-UTRAN \, FDD} = T_{Identify, E-UTRAN \, FDD}$ - $T_{measure, E-UTRAN \, FDD}$ is according to clause 9.4.2 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \, FDD}$ =0 when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver (T_{MIB} =0 when *nr-LTE-SFN-Offset* is provided in the E-UTRA OTDOA assistance data), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when *cellGlobalId* is included in *OTDOA-ReferenceCellInfo* and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when *cellGlobalId* is not included in *OTDOA-ReferenceCellInfo* or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this section shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.2.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-1. When $T_{ECGI}>0$ and UE is using autonomous gaps during T_{ECGI} , the UE shall transmit at least $N_{ACK/NACK, ECGI, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-2. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, FDD}$ ACK/NACKs specified in Table 9.4.4.1.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.1.2.2-1, 9.4.4.1.2.2-2, and 9.4.4.1.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.1.2.2-1: Number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, fdd	Nack/Nack, MIB, FDD Configuration of the serving cell in which the transmitte are counted	
	Duplex mode configuration	scs
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz
	uration is as specified in Table A.3.3.1-1 of uration is as specified in Table A.3.3.1-1 of	

Table 9.4.4.1.2.2-2: Number of ACK/NACKs transmitted by the UE during T_{ECGI}

Nack/nack, ecgi, fdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
66	FDD	15 kHz
145	FDD	30 kHz
298	FDD	60 kHz
28	TDD Note 1	15 kHz
67	TDD Note 1	30 kHz
144	TDD Note 1	60 kHz
175	TDD Note 2	60 kHz
363	TDD Note 2	120 kHz
NOTE 1: TDD UL-DL config	uration is as specified in Table A.3.3.1-1 of TS	38.101-1 [18].

NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.1.2.2-3: Number of ACK/NACKs transmitted by the UE during T_{MIB}+T_{ECGI}

Nack/nack, mib+ecgi, fdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
84	FDD	15 kHz
193	FDD	30 kHz
402	FDD	60 kHz
28	TDD Note 1	15 kHz
81	TDD Note 1	30 kHz
159	TDD Note 1	60 kHz
233	TDD Note 2	60 kHz
491	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

9.4.4.2 NR - E-UTRAN TDD RSTD measurements

9.4.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSTD measurements requested via LPP [22, 27].

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or

- the UE is provided with nr-LTE-SFN-Offset but not with nr-LTE-fineTiming-Offset.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts. When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts.

9.4.4.2.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT -UTRAN TDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{\rm RSTD\ InterRAT,E-UTRAN\ TDD}$ ms as given below:

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

where

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

 $T_{\rm PRS}$ 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 clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN TDD carrier frequencies.

Table 9.4.4.2.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,E-UTRAN\ TDD}$

Positioning subframe	Number of PRS pos	itioning occasions $\it M$
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 × CSSFinterRAT	32 × CSSFinterRAT
>160 ms	8 x CSSF _{interRAT}	16 x CSSFinterRAT

NOTE 1: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN TDD carrier frequency f2.

NOTE 2: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN TDD carrier frequency f1 and the E-UTRAN TDD carrier frequency f2 respectively.

The requirements in this 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 are specified in Table 4.2-2 in TS 36.211 [23].	

Table 9.4.4.2.2-3: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements without gaps

PRS Transmission Bandwidth [RB]	Applicable TDD uplink-downlink configurations
6, 15	1, 2, 3, 4 and 5
25, 50, 75, 100	0, 1, 2, 3, 4, 5 and 6
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].	

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{\text{RSTD InterRAT, E-UTRAN TDD}}$ provided:

 $(PRS \hat{E}_s / Iot)_{ref} \ge -6 \text{ dB for all Frequency Bands for the reference cell,}$ $(PRS \hat{E}_s / Iot)_i \ge -13 \text{ dB for all Frequency Bands for neighbour cell } i,$

 $\left(\text{PRS }\hat{\mathbf{E}}_{s} / \text{Iot}\right)_{ref}$ 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,

occasions,

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

PRS \hat{E}_s / Iot is as defined in clause 9.4.4.1.2.

The time $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.2.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.2.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra*-

FineTimingDetection according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{\text{RefCell,E-UTRAN}} = T_{\text{Detect, E-UTRAN TDD}} + T_{\text{MIB}} + T_{\text{ECGI}}$$

where

 $T_{Detect, E-UTRAN \ TDD} = T_{Identify, E-UTRAN \ TDD}$ - $T_{measure, E-UTRAN \ TDD}$ is according to clause 9.4.3 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \ TDD}=0$ when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver ($T_{MIB} = 0$ when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data) , and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this section shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.3.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.2.2.2-1. When $T_{ECGI}>0$ and UE is using autonomous gaps during T_{ECGI} , the UE shall transmit at least $N_{ACK/NACK, ECGI, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created, specified in Table 9.4.4.2.2.2-2. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, TDD}$ ACK/NACKs specified in Table 9.4.4.2.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.2.2.2-1, 9.4.4.2.2.2-2 and 9.4.4.2.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,

- SSBs are transmitted in one slot within SMTC window. Table 9.4.4.2.2.2-1: Minimum number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, tdd	Configuration of the serving cell in which the transmitted ACK/NAC are counted	
	Duplex mode configuration	SCS
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz
	uration is as specified in Table A.3.3.1-1 o uration is as specified in Table A.3.3.1-1 o	

Table 9.4.4.2.2.2: Number of ACK/NACKs transmitted by the UE during T_{ECGI}

Nack/nack, ecgi, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
66	FDD	15 kHz
145	FDD	30 kHz
298	FDD	60 kHz
28	TDD Note 1	15 kHz
67	TDD Note 1	30 kHz
144	TDD Note 1	60 kHz
175	TDD Note 2	60 kHz
363	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.2.2.2-3: Number of ACK/NACKs transmitted by the UE during T_{MIB}+T_{ECGI}

NACK/NACK, MIB+ECGI, TDD	Configuration of the serving cell in which the transmitted ACK/NAC are counted	
	Duplex mode configuration	scs
84	FDD	15 kHz
193	FDD	30 kHz
402	FDD	60 kHz
28	TDD Note 1	15 kHz
81	TDD Note 1	30 kHz
159	TDD Note 1	60 kHz
233	TDD Note 2	60 kHz
491	TDD Note 2	120 kHz
	ration is as specified in Table A.3.3.1-1 of ration is as specified in Table A.3.3.1-1 of	

9.4.5 Inter-RAT E-CID measurements

9.4.5.1 NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements

9.4.5.1.1 Introduction

The requirements in clause 9.4.5.1. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN FDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.1.2 Requirements

The requirements in clause 9.4.2 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.1.3.

9.4.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.4.5.2 NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements

9.4.5.2.1 Introduction

The requirements in clause 9.4.5.2. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN TDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.2.2 Requirements

The requirements in clause 9.4.3 also apply for this section except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.2.3.

9.4.5.2.3 Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.5 L1-RSRP measurements for Reporting

9.5.1 Introduction

When configured by the network, the UE shall be able to perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed for a serving cell, including PCell, PSCell, or SCell, on the resources configured for L1-RSRP measurements within the active BWP.

The UE shall be able to measure all CSI-RS resources and/or SSB resources of the *nzp-CSI-RS-ResourceSet* and/or *csi-SSB-ResourceSet* within the CSI-Resource*Config* settings configured for L1-RSRP for the active BWP, provided that the number of resources does not exceed the UE capability indicated by *beamManagementSSB-CSI-RS*.

The UE shall report the measurement quantity (*reportQuantity*) and send periodic, semi-persistent or aperiodic reports, according to the *reportConfigType* according to the CSI reporting configuration(s) (*CSI-ReportConfig*) for the active BWP.

9.5.2 Requirements applicability

The requirements in clause 9.5 apply, provided:

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

An SSB resource configured for L1-RSRP shall be considered measurable when for each relevant SSB the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.1 and 10.1.20.1 for FR1 and FR2, respectively, for a corresponding band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.4.1 for a corresponding band.

A CSI-RS resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.2 and 10.1.20.2 for FR1 and FR2, repectively, for a corresponding band,
- CSI-RS_RP and CSI-RS Ês/Iot according to Annex B.2.4.2 for a corresponding band.

A CSI-RS and SSB resource configured for L1-RSRP shall be considered measurable when the measurable resource conditions are met for both CSI-RS resource and SSB resource.

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

9.5.3 Measurement Reporting Requirements

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to clause 10.1.19 for FR1 and 10.1.20 for FR2 if nrofReportedRS is configured to one. If nrofReportedRS is configured to be larger than one, or if groupBasedBeamReporting is enabled, the UE shall use differential L1-RSRP based reporting as defined in clause 10.1.19 for FR1 and 10.1.20 for FR2. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in 10.1.6.

9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 36.300 [24].

9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in a Semi-Persistent L1-RSRP measurement report shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUSCH, if a DCI request has been received.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUCCH, if an activation command [7] has been received.

The UE shall transmit the semi-persistent L1-RSRP reporting on PUSCH or PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 36.300 [24].

9.5.3.3 Aperiodic Reporting

Reported L1-RSRP measurements contained in aperiodic triggered, aperiodic triggered periodic and aperiodic triggered semi-persistent L1-RSRP reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send aperiodic L1-RSRP measurement reports, if a DCI trigger has been received.

After the UE receives CSI request in DCI, the UE shall transmit the aperiodic L1-RSRP reporting on PUSCH over the air interface at the time specified according to clause 6.2.1.2 in TS 36.300 [24].

9.5.4 L1-RSRP measurement requirements

9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_SSB}$.

The value of T_{L1-RSRP} Measurement Period SSB is defined in Table 9.5.4.1-1 for FR1 and Table 9.5.4.1-2 for FR2, where

- M=1 if higher layer parameter timeRestrictionForChannelMeasurement is configured, and M=3 otherwise
- N=8.

For FR1,

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

For FR2.

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

- if all of the reference signals configured for L1-RSRP reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or
- if all of the reference signal configured for L1-RSRP reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by SSB-ToMeasure and 1 symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured;
- $P_{\text{sharing factor}} = 3$, otherwise.

Where:

 $T_{SSB} = ssb$ -periodicityServingCell

T_{SMTCperiod} = the configured SMTC1 period or SMTC2 period if configured

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

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

Table 9.5.4.1-1: Measurement period T_{L1-RSRP Measurement Period SSB} for FR1

Configuration T _{L1-RSRP_Measurement_Period_SSB} (ms)	
non-DRX	max(T _{Report} , ceil(M*P)*T _{SSB})
DRX cycle ≤ 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} = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting.	

Table 9.5.4.1-2: Measurement period T_{L1-RSRP Measurement Period SSB} for FR2

Con	figuration	T _{L1-RSRP_Measurement_Period_SSB} (ms)
no	on-DRX	max(T _{Report} , ceil(M*P*N)*T _{SSB})
DRX cy	rcle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{SSB}))
DRX cy	/cle > 320ms	ceil(1.5*M*P*N)*T _{DRX}
Note:		eriodicityServingCell is the periodicity of the SSB-Index
configured for L1-RSRP measurement. TDRX is the DRX cycle length.		
T _{Report} is configured periodicity for reporting.		

9.5.4.2 CSI-RS based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured CSI-RS resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_CSI-RS}$.

The value of T_{L1-RSRP_Measurement_Period_CSI-RS} is defined in Table 9.5.4.2-1 for FR1 and in Table 9.5.4.2-2 for FR2, where

- For periodic and semi-persistent CSI-RS resources, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise
- For aperiodic CSI-RS resources M=1
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply if *qcl-InfoPeriodicCSI-RS* is configured for all the resources in the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or

- another CSI-RS in resource set configured with repetition ON.
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requriements apply provided *qcl-info* is configured for all resources in the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.19.2 and 10.1.20.2 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requirements apply provided *qcl-info* is configured for all resources in the resource set.

For FR1,

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

For FR2.

- P=1, when CSI-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=\frac{1}{1-\frac{T_{CSI-RS}}{MRGP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- P=3, when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion (T_{CSI-RS} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MRGP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}, \text{ when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < <math>T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{CSI-RS} < 0.5*T_{SMTCperiod}$

- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MRGP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- $-P = \frac{1}{1 \frac{T_{CSI-RS}}{\min(T_{SMTCperiod}, MGRP)}}, \text{ when CSI-RS is partially overlapped with measurement gap } (T_{CSI-RS} < MGRP) \text{ and } (T_{CSI-RS} < MGRP)$

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

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

Where:

 $T_{SMTCperiod}$ = the configured SMTC1 period or SMTC2 period if configured.

T_{CSI-RS} = the periodicity of CSI-RS configured for L1-RSRP measurement

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

Note: The overlap between CSI-RS for L1-RSRP measurement and SMTC means that CSI-RS for L1-RSRP measurement is within the SMTC window duration.

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

Table 9.5.4.2-1: Measurement period T_{L1-RSRP Measurement Period CSI-RS} for FR1

Conf	iguration	T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)
nc	n-DRX	max(T _{Report} , ceil(M*P)*T _{CSI-RS})
DRX cyc	cle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{CSI-RS}))
DRX cy	cle > 320ms	ceil(M*P)*T _{DRX}
Note 1:	T _{CSI-RS} is the	periodicity of CSI-RS configured for L1-RSRP
measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting. Note 2: the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3.		

Table 9.5.4.2-2: Measurement period T_{L1-RSRP_Measurement_Period_CSI-RS} for FR2

Configuration		T _{L1-RSRP_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:	T _{CSI-RS} is the	periodicity of CSI-RS configured for L1-RSRP
Note 2:	periodicity for the requireme	ents are applicable provided that the CSI-RS resource
	3	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 SSB and CSI-RS for L1-RSRP without measurement gaps. The UE is required to perform the SSB and CSI-RS measurements with measurement restrictions as described in the following clauses.

9.5.5.1 Measurement restriction for SSB based L1-RSRP

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

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
 - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

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

9.5.5.2 Measurement restriction for CSI-RS based L1-RSRP

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

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

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

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

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

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

For FR2, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- In the following cases, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and the
 other CSI-RS. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no
 requirements are defined.
 - The CSI-RS for L1-RSRP measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

9.5.6 Scheduling availability of UE during L1-RSRP measurement

Scheduling availability restrictions when the UE is performing L1-RSRP measurement are described in the following clauses.

9.5.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH in FR1.

9.5.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as RS for L1-RSRP measurement.

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

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

9.5.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- For the case where RS for L1-RSRP measurement is CSI-RS which is QCLed with active TCI state for PDCCH/PDSCH and not in a CSI-RS resource set with repetition ON, and N=1 applies as specified in clause 9.4.5.2
 - There are no scheduling restrictions due to L1-RSRP measurement performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on RS for L1-RSRP measurement symbols to be measured for L1-RSRP measurement.

When intra-band carrier aggregation is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the band on the symbols that fully or partially overlap with restricted symbols.

If following conditions are met,

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

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

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

9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

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

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

9.6 NE-DC: Measurements

9.6.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA FDD or TDD PSCell. The requirements apply to UEs that have been configured with NE-DC.

9.6.2 SFTD Measurements

9.6.2.1 Introduction

This clause contains requirements on UE capabilities for reporting of SFN and frame time difference between NR PCell and E-UTRA PSCell in RRC_CONNECTED state. The requirements comprise measurement reporting delay and measurement accuracy. The overall measurement reporting delay includes a RRC procedure delay specified in TS 38.331 [2], and the SFTD measurement reporting delay specified below.

9.6.2.2 SFTD Measurement requirements

When no DRX is used in either of the NR PCell and E-UTRA PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(0.2,[5] * SMTC period)$ s.

When DRX is used in either of the NR PCell or the E-UTRA PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in Table 9.6.2.2-1.

Table 9.6.2.2-1: SFTD measurement requirement when DRX is used

DR	X cycle length (s)Note2	T _{measure_} SFTD1 (s)
	DRX cycle≤0.04	max(0.2,5 x SMTC period) (Note1)
0	.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.3	32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note1: Note2:	DRX cycle length in this tab configured for PCell or PSC	ends upon the DRX cycle in use le refers to the DRX cycle length ell. When DRX is used in both PCell and this table refers to the longer of the DRX PSCell.

If PSCell is changed without changing carrier frequency of PSCell while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure\ SFTD2} = (M+1)*(T_{measure\ SFTD1}) + M*T_{PSCell\ change\ NEDC}$$

where:

M is the number of times the E-UTRA PSCell is changed over the measurement period (Tmeasure_SFTD2), and

T_{PSCell_change_NEDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed to a different carrier frequency, the UE shall terminate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in clause 10.1.21.1.

10 Measurement Performance requirements

10.1 NR measurements

10.1.1 Introduction

The requirements in clause 10.1 apply as follows:

- intra-frequency requirements apply for PCell measurements in SA, NR-DC, or NE-DC operaion mode,
- intra-frequency requirements apply for PSCell measurements in NR-DC or EN-DC operation mode,
- intra-frequency requirements apply for SCell measurements in SA operation mode with NR CA or any MR-DC operation mode with NR CA,
- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

10.1.2 Intra-frequency RSRP accuracy requirements for FR1

10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accuracy		Conditions							
Normal	Normal Extreme		SSB NB		lo ^{Note 1} range				
condition	condition	Ês/lot	NR operating band groups Note 2		Minimur	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, NR_SDL_FR1_A	-121	-118	N/A	-70		
		±9 ≥-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	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_G,	N/A	N/A	-70	-50		

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

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR1.

The accuracy requirements in Table 10.1.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accuracy				Condit	ions				
Normal	Extreme	SSB	Io Note 1 range						
condition	condition	Ês/lot Note 2	NR operating band groups Note 4		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2	±3	±3 ≥-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	±3	≥-6 dB	Note 3	Note 3	Note 3	N/A	Note 3		

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.2 Void

10.1.3 Intra-frequency RSRP accuracy requirements for FR2

10.1.3.1 Intra-frequency SS-RSRP accuracy requirements

10.1.3.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.3.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	ıracy	Conditions					
Normal	Extreme	SSB		I	o ^{Note 2} range		
condition	condition	Ês/lot		Minimum	lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = SCS _{SSB} =		dBm/BW _{Channel}	dBm/BW _{Channel}	
			120kHz	240kHz			
		≥-6	Same value	as SSB_RP			
			in Table B.2.2-2,				
±[6]	±[9]		according to	UE Power	N/A	-70	
			class, oper	ating band			
			and angle	of arrival			
±[8]	±[11]		N,	/A	-70	-50	
Note 1: V	aluge hasad or	Pofeane and	FIS enharical	coverage as o	defined in clauses 7	3.2 and 7.3.4 of	

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of

TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.3.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR2.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Acc	uracy		Conditions				
Normal	Normal Extreme		lo ^{Note 2} ra		nge		
condition	condition	Ês/lot	Minim	ium lo	Maximum lo		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±6	±9	≥-6	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50		
С	alues based of lauses 7.3.2 ar elected depend	nd 7.3.4 of TS	38.101-2 [19]				
а	cross the band	lwidth.	,		e constant EPRE		
a th							
	he parameter thich the require			SSB Ês/lot of	the pair of cells to		

10.1.3.2 Void

10.1.4 Inter-frequency RSRP accuracy requirements for FR1

10.1.4.1 Inter-frequency SS-RSRP accuracy requirements

10.1.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.4.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

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

Accuracy		Conditions							
Normal Extreme		SSB		lo ^N					
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	N/A	-70		
±4.5	±9	≥-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_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_B, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50		

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

NOTE 2: Void

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.1.2 Relative Accuracy of SS-RSRP in FR1

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency in FR1compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.4.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB

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

Accı	Accuracy			Condition				
Normal	Extreme	SSB	lo ^{Note 1} range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimu	n Io	Maximum lo	
		dB		dBm/S	CS _{SSB}			
dB	dB			SCS _{SSB} = SCS _{SSB} = 30 kHz		dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±4.5	±6	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119 -116 N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	

NOTE 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 clause 3.5.2.

10.1.4.2 Void

10.1.5 Inter-frequency RSRP accuracy requirements for FR2

10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

-50

±[8]

Accuracy **Conditions** lo Note 2 range SSB **Extreme** Normal Ês/lot condition condition Minimum Io Maximum lo dBm / SCS_{SSB} Note 1 SCS_{SSB} = SCS_{SSB} = dB dB dB dBm/BW_{Channel} dBm/BW_{Channel} 120kHz 240kHz Same value as SSB RP in Table B.2.3-2, according to UE Power N/A -70 ±[6] ±[9] ≥-4 class, operating band

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

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

and angle of arrival N/A

-70

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.5.1.2 Relative SS-RSRP Accuracy

±[11]

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell on a frequency in FR2 compared to the SS-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	Accuracy Conditions					
Normal Extreme		SSB		lo ^{Note 2} range	е	
condition	condition	Ês/lot		um lo	Maximum lo	
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}	
			120kHz	240kHz		
			Same value a	s SSB_RP in		
±6	±9	≥-4		, according to	-50	
10	19	2-4	UE Power class, operating		-30	
			band and an			
			and EIS spheric			
			TS 38.101-2 [19	9]. Applicable si	de condition	
	selected depe					
			ce point, and as	sumed to have	constant EPRE	
-	across the ba		<u> </u>			
					may need to be	
	•	isure Es/lot a	it UE baseband	is above the va	ilue defined in	
	his table.	00D Ê # 4		00D Ê #		
				SSB Es/lot of t	the pair of cells to	
V	which the req	uirement app	lies.			

10.1.5.2 Void

10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting is defined from $0~\mathrm{dBm}$ to $-30~\mathrm{dB}$ 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
RSRP_127 (Note)	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 (for L1 reporting) report mapping

Reported value	Measured quantity value (difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0 ≥ △ RSRP>-2	dB
DIFFRSRP_1	-2≥ ∆ RSRP>-4	dB
DIFFRSRP_2	-4≥ ∆ RSRP>-6	dB
DIFFRSRP_3	-6≥ ∆ RSRP>-8	dB
DIFFRSRP_4	-8≥ ∆ RSRP>-10	dB
DIFFRSRP_5	-10≥ ∆ RSRP>-12	dB
DIFFRSRP_6	-12≥ ∆ RSRP>-14	dB
DIFFRSRP_7	-14≥ ∆ RSRP>-16	dB
DIFFRSRP_8	-16 ≥ △ RSRP>-18	dB
DIFFRSRP_9	-18 ≥ △ RSRP>-20	dB
DIFFRSRP_10	-20≥ ∆ RSRP>-22	dB
DIFFRSRP_11	-22≥ △ RSRP>-24	dB
DIFFRSRP_12	-24≥ ∆ RSRP>-26	dB
DIFFRSRP_13	-26≥ △ RSRP>-28	dB
DIFFRSRP_14	-28 ≥ △ RSRP>-30	dB
DIFFRSRP_15	-30 ≥ △ RSRP	dB

10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.7.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accuracy			Conditions							
Normal	Extreme	SSB	Io Note 1 range							
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum Io			
		dB		dBm /	SCS _{SSB}					
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50			
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±2.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2			

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

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.8 Intra-frequency RSRQ accuracy requirements for FR2

10.1.8.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

10.1.8.1.1 Absolute SS-RSRQ Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.8.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Acc	uracy		Conditions				
Normal	Extreme	SSB	lo Note 2 range				
condition	condition	Ês/lot	Minim	num lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}		
±2.5	<u>±</u> 4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±3.5	±4	≥-6	class, operating ba arrival	and and angle of	-50		
Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.							
Note 2: Id	specified at th	fied at the Reference point, and assumed to have constant EPRE across the bandwidth.					
			lot and related para te the value defined		be adjusted to ensure		

10.1.9 Inter-frequency RSRQ accuracy requirements for FR1

10.1.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

10.1.9.1.1 Aboslute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.9.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

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

Accı	ıracy		Conditions						
Normal	mal Extreme			lo ^{Note 1} range					
condition	condition	SSB Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
				NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

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

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.9.1.2 Relative Accuracy of SS-RSRQ in FR1

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR1 compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.9.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27 dB$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

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

Accı	ıracy			Condit				
Normal Extreme		SSB						
condition	condition	Ês/lot Note 2	NR operating band groups Note 4				Maximum lo	
		dB		dBm /	SCS _{SSB}			
dB	dB			SCS _{SSB} = 15 kHz	SCSssB = SCSssB = dB		dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3	

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

10.1.10 Inter-frequency RSRQ accuracy requirements for FR2

10.1.10.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

10.1.10.1.1 Aboslute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.10.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

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

Acc	uracy		Conditions				
Normal	Extreme	SSB	lo Note 2 range				
condition	condition	Ês/lot	Minim	num lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}		
±2.5	<u>±</u> 4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±3.5	±4	≥-4	class, operating baarrival	and and angle of	-50		
Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.							
Note 2: Id	specified at th	the Reference point, and assumed to have constant EPRE across the bandwidth.					
			lot and related para ve the value defined		be adjusted to ensure		

10.1.10.1.2 Relative Accuracy of SS-RSRQ in FR2

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR2 compared to the RSRP measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.10.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Acc	uracy		Conditions					
Normal	Extreme	SSB		lo ^{Note 2} range				
condition	condition	Ês/lot	Minimum Io		Maximum Io			
			dBm / SC	S _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}			
±3	±4	≥-3	Same value as SS B.2.2-2, according	to UE Power	-50			
±4	±4	≥-4	class, operating band and angle of arrival		-50			
			EIS spherical coverside condition selected		auses 7.3.2 and 7.3.4 of gle of arrival.			
Note 2: Id	specified at th	ne Reference p	point, and assumed	to have constant EP	RE across the bandwidth.			
Note 3: T	he parameter S	SSB Ês/lot is t	he minimum SSB Ê:	s/lot of the pair of ce	ells to which the			
re	requirement applies.							
			/lot and related parameters may need to be adjusted to ensure					
Ê	s/lot at UE bas	seband is abov	e the value defined	in this table.				

10.1.11 RSRQ report mapping

10.1.11.1 SS-RSRQ measurement report mapping

The reporting range of SS-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-1: SS-RSRQ measurement report mapping

Reported value	Measured quantity value	Unit
SS-RSRQ_0	SS-RSRQ<-43	dB
SS-RSRQ_1	-43≤ SS-RSRQ<-42.5	dB
SS-RSRQ_2	-42.5≤ SS-RSRQ<-42	dB
SS-RSRQ_3	-42≤ SS-RSRQ<-41.5	dB
SS-RSRQ_4	-41.5≤ SS-RSRQ<-41	dB
SS-RSRQ_122	17.5≤ SS-RSRQ<18	dB
SS-RSRQ_123	18≤ SS-RSRQ<18.5	dB
SS-RSRQ_124	18.5≤ SS-RSRQ<19	dB
SS-RSRQ_125	19≤ SS-RSRQ<19.5	dB
SS-RSRQ_126	19.5≤ SS-RSRQ<20	dB
SS-RSRQ_127	20 ≤ SS-RSRQ	dB

10.1.12 Intra-frequency SINR accuracy requirements for FR1

10.1.12.1 Intra-frequency SS-SINR accuracy requirements in FR1

10.1.12.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.12.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.

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

Accı	ıracy		Conditions					
Normal	Extreme	SSB						
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum Io Maximu			
		dB		dBm /	SCS _{SSB}			
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.13 Intra-frequency SINR accuracy requirements for FR2

10.1.13.1 Intra-frequency SS-SINR accuracy requirements in FR2

10.1.13.1.1 Absolute SS-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.13.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Acci	uracy		Conditions				
Normal	Extreme	SSB	lo ^{Note 2} range				
condition	condition	Ês/lot		ium lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}		
±3	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50		
±3.5	±4	≥-6			-30		
					lauses 7.3.2 and 7.3.4 of		
T	S 38.101-2 [19]. Applicable s	side condition select	ed depending on an	gle of arrival.		
Note 2: Ic	specified at th	ne Reference p	point, and assumed	to have constant EF	PRE across the bandwidth.		
Note 3: In	the test cases	s, the SSB Ês/	s/lot and related parameters may need to be adjusted to ensure				
Ê	s/lot at UE bas	eband is abov	ove the value defined in this table.				
Note 4: T	he requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.				

10.1.14 Inter-frequency SINR accuracy requirements for FR1

10.1.14.1 Inter-frequency SS-SINR accuracy requirements in FR1

10.1.14.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.14.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

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

Accı	ıracy			Condit			
Normal	Extreme	SSB		lo ^{Note 1} range			
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum Io Maximu		
		dB		dBm /	SCS _{SSB}		
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	N/A	-50
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50
±3.5	<u>±</u> 4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.14.1.2 Relative Accuracy of SS-SINR in FR1

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR1 compared to the SS-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.14.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \leq 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.14.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

Accı	ıracy		Conditions					
Mormal	Normal Extreme		Io ^{Note 1} range					
condition	condition	Ês/lot Note 2,4	NR operating band groups Note 5		Minimum Io Maximum			
		dB		dBm/S	SCS _{SSB}			
dB	dB			SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
+4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3	

- NOTE 1: lo is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Es/lot is the minimum SSB Es/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: The requirements apply for SSB Ês/lot ≤ [25] dB.
- NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.15 Inter-frequency SINR accuracy requirements for FR2

10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Ac	curacy		Conditions				
Normal	Extreme	SSB		je			
condition	condition	Ês/lot	Minim	ium lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±3	<u>±</u> 4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±3.5	±4	≥-4	class, operating ba arrival	and angle of	-50		
			EIS spherical coverside condition selecte		lauses 7.3.2 and 7.3.4 of gle of arrival.		
Note 2:	Io specified at th	ne Reference p	ence point, and assumed to have constant EPRE across the bandwidth.				
			Not and related parameters may need to be adjusted to ensure ove the value defined in this table.				
Note 4:	The requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.				

10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR2 compared to the SS-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB

Accuracy

- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Conditions

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

Extreme	SSB	lo ^{Note 2} range			lo Note 2 range		e
condition	Ês/lot	Minimum Io		Maximum Io			
		dBm / SCS _{SSB} Note 1 SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz					
dB	dB			dBm/BW _{Channel}			
±4	≥-3		50				
±4	≥-6	class, operating ba arrival	and angle of	-50			
38.101-2 [19]. Applicable s	ide condition selecte	ed depending on an	gle of arrival.			
ne parameter S	SSB Ês/lot is t	he minimum SSB Ê	s/lot of the pair of ce	ells to which the			
4: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.							
ne requirement	ts apply for SS	SB Ês/lot ≤ 25 dB.					
	±4 ±4 slues based or 38.101-2 [19 specified at the parameter squirement app the test cases //lot at UE bas	dB ±4 ≥-3 ±4 ≥-6 slues based on Refsens and 38.101-2 [19]. Applicable s specified at the Reference per parameter SSB Ês/lot is the quirement applies. the test cases, the SSB Ês/lot at UE baseband is above	dB dB dB SCSsss = 120kHz ±4 ≥-3 Same value as SS B.2.2-2, according class, operating be arrival **Alues based on Refsens and EIS spherical cover is 38.101-2 [19]. Applicable side condition selected specified at the Reference point, and assumed the parameter SSB Ês/lot is the minimum SSB Ês quirement applies. **The description of the description of t	dB dB dB SCSssB Note 1 SCSssB = SCSssB = 240kHz ±4 ≥-3 Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival lues based on Refsens and EIS spherical coverage as defined in class. 38.101-2 [19]. Applicable side condition selected depending on an specified at the Reference point, and assumed to have constant EP the parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of centre could be considered as a specified at the Reference point, and assumed to have constant EP the parameter SSB Ês/lot and related parameters may need to condition at UE baseband is above the value defined in this table.			

10.1.16 SINR report mapping

10.1.16.1 SS-SINR measurement report mapping

The reporting range of SS-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR measurement report mapping

Reported value	Measured quantity value	Unit
SS-SINR_0	SS-SINR<-23	dB
SS-SINR_1	-23≤ SS-SINR<-22.5	dB
SS-SINR_2	-22.5≤ SS-SINR<-22	dB
SS-SINR_3	-22≤ SS-SINR<-21.5	dB
SS-SINR_4	-21.5≤ SS-SINR<-21	dB
SS-SINR_123	38≤ SS-SINR<38.5	dB
SS-SINR_124	38.5≤ SS-SINR<39	dB
SS-SINR_125	39≤ SS-SINR<39.5	dB
SS-SINR_126	39.5≤ SS-SINR<40	dB
SS-SINR_127	40≤ SS-SINR	dB

10.1.17 Power Headroom

10.1.17.1 Power Headroom Report

10.1.17.1.1 Power Headroom Report Mapping

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Table 10.1.17.1-1: Power headroom report mapping

Reported value	Measured quantity value (dB)
POWER_HEADROOM_0	PH < -32
POWER_HEADROOM_1	-32 ≤ PH < -31
POWER_HEADROOM_2	-31 ≤ PH < -30
POWER_HEADROOM_3	-30 ≤ PH < -29
POWER_HEADROOM_53	20 ≤ PH < 21
POWER_HEADROOM_54	21 ≤ PH < 22
POWER_HEADROOM_55	22 ≤ PH < 24
POWER_HEADROOM_56	24 ≤ PH < 26
POWER_HEADROOM_57	26 ≤ PH < 28
POWER_HEADROOM_58	28 ≤ PH < 30
POWER_HEADROOM_59	30 ≤ PH < 32
POWER_HEADROOM_60	32 ≤ PH < 34
POWER_HEADROOM_61	34 ≤ PH < 36
POWER_HEADROOM_62	36 ≤ PH < 38
POWER_HEADROOM_63	PH ≥ 38

10.1.18 PCMAX,c,f

The UE is required to report the UE configured maximum output power $(P_{CMAX,c,f})$ together with the power headroom. This clause defines the requirements for the $P_{CMAX,c,f}$ reporting.

10.1.18.1 Report Mapping

The $P_{CMAX,c,f}$ reporting range is defined from -29 dBm to 33 dBm with 1 dB resolution. Table 10.1.18.1-1 defines the reporting mapping.

Table 10.1.18.1-1 Mapping of P_{CMAX,c.f}

Reported value	Measured quantity value	Unit
PCMAX_C_00	P _{CMAX,c,f} < -29	dBm
PCMAX_C_01	-29 ≤ P _{CMAX,c,f} < -28	dBm
PCMAX_C_02	-28 ≤ P _{CMAX,c,f} < -27	dBm
	•••	
PCMAX_C_61	31 ≤ P _{CMAX,c,f} < 32	dBm
PCMAX_C_62	32 ≤ P _{CMAX,c,f} < 33	dBm
PCMAX_C_63	33 ≤ P _{CMAX,c,f}	dBm

10.1.19 L1-RSRP accuracy requirements for FR1

10.1.19.1 SSB based L1-RSRP accuracy requirements

10.1.19.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

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

Acc	uracy			Condi					
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot	NR operating band groups Note 2	pand Minimum		lo	Maximum Io		
		dB		dBm/	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
		≥-3dB	NR_TDD_FR1_C	-120	-117	N/A	-70		
±5.0	±9.5		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70		
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50		

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

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.19.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

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

Accuracy			Conditions						
Normal	Extreme	SSB	lo ^{Note 1} range						
condition	condition	Ês/lot Note 2			lo	Maximum Io			
				dBm / SCS _{SSB}					
dB	dB	dB		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		

NOTE 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: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2..

10.1.19.2 CSI-RS based L1-RSRP accuracy requirements

10.1.19.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.1-1.

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

Accı	ıracy		Conditions								
Normal	Extreme	CSI-			lo ^{Note}	¹ range					
condition	condition	RS Ês/lot	NR operating band groups ^{Note 2}		Minimum Io			Maximum Io			
				dB	m / SCS _{CS}	il-RS					
dB	dB	dB		SCS _{CSI-} RS = 15 kHz	SCS _{CSI-} RS = 30 kHz	SCS _{CSI-} RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-70			
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-70			
			NR_TDD_FR1_C	-120	-117	-114	N/A	-70			
±5.0	±9.5	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-70			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-70			
			NR_FDD_FR1_G	-118	-115	-112	N/A	-70			
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-70			
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	N/A	-70	-50			

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

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

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

Accı	ıracy				Condition				
		CSI-		lo ^{Note 1} range					
Normal condition	Extreme condition	RS Ês/lot Note 2	NR operating band groups ^{Note 4}		Minimum Io			Maximum Io	
		dB		dB	m / SCScs	SI-RS			
dB	dB			SCScsi- RS = 15 kHz	SCScsi- RS = 30 kHz	SCScsi- RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	-114	N/A	-50	
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-50	
			NR_FDD_FR1_G	-118	-115	-112	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-50	

NOTE 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: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.20 L1-RSRP accuracy requirements for FR2

10.1.20.1 SSB based L1-RSRP accuracy requirements

10.1.20.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	ıracy		Conditions			
Normal	Extreme	SSB	lo ^{Note 1} range			
condition	condition	Ês/lot	Minimum Io			Maximum Io
			dBm / SCS _{SSB} Note 2			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}

±6.5	±9.5	≥-3	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	N/A	-70
±8.5	±11.5	≥-3	N/A	-70	-50

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.20.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	uracy		Co	nditions			
Normal	Extreme	SSB		lo Note 1 range	е		
condition	condition	Ês/lot	Minim	um lo	Maximum Io		
			dBm / SC	Sss Note 3			
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}		
			120kHz	240kHz			
			Same value a	s SSB_RP in			
				Table B.2.4.1-2, according			
±6.5	±9.5	≥-3	to UE Power class,		-50		
				operating band and angle			
				rival			
	•		ce point, and as	sumed to have	constant EPRE		
	across the ba			-			
				SSB Es/lot of t	the pair of SSBs		
	o which the r	•					
		ed on Refsens and EIS spherical coverage as defined in					
		2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition					
	selected depending on angle of arrival. In the test cases, the SSB Es/lot and related parameters may need to be						
			Es/lot and relat It UE baseband				

10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

this table.

10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.1-1.

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

Accı	ıracy	Conditions				
Normal	Extreme	CSI-RS		lo Note 1 range		
condition	condition	Ês/lot		Minimum	lo	Maximum lo
			dBm / SCS	Scsi-Rs Note 2		
dB	dB	dB	SCS _{CSI-RS} = 60kHz	SCS _{CSI-RS} = 120kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
±6.5	±9.5	≥-3	RS_RP in Tage 2, accord Power class	ue as CSI- able B.2.4.2- ling to UE s, operating agle of arrival	N/A	-70
+8.5	+11.5	≥-3		/A	-70	-50

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.20.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.2-1.

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

Accı	ıracy	CSI-RS Conditions				
Normal	Extreme	CSI-RS		е		
condition	condition	Ês/lot	Minimum Io		Maximum Io	
			dBm / SCS _{CSI-RS}		•	
dB	dB	dB	SCScsi-RS = SCScsi-RS = 60kHz 120kHz		dBm/BW _{Channel}	

±6.5	±9.5	≥-3	Same value as CSI-RS RP in Table B.2.4.2-2, according to UE Power class, operating band and angle of arrival	-50		
NOTE 1:	NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE					
	across the bandwidth.					
NOTE 2:	The paramete	er CSI-RS Ês	s/lot is the minimum CSI-RS Ês/	lot of the pair of		
	CSI-RS resou	rces to whic	h the requirement applies.	·		
NOTE 3:	Values based	on Refsens	and EIS spherical coverage as	defined in		
			TS 38.101-2 [19]. Applicable si			
	selected depending on angle of arrival.					
NOTE 4:	In the test cases, the CSI-RS Ês/lot and related parameters may need to					
	be adjusted to ensure Ês/lot at UE baseband is above the value defined in					

10.1.21 SFTD accuracy requirements

10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell lo range conditions in FR1

	lo ^{Note 1} range							
	NR operating band groups Note 4, 5	Minimun	n lo ^{Note 2, 3}	Maximum Io				
Parameter		dBm/	SCS _{SSB}					
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}				
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50				
	NR_FDD_FR1_B	-120.5	-117.5	-50				
	NR_TDD_FR1_C	-120	-117	-50				
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50				
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50				
	NR_FDD_FR1_G	-118	-115	-50				
	NR_FDD_FR1_H	-117.5	-114.5	-50				

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The condition level is increased by ΔR_{IB,c} as defined in clause 7.3B in TS 38.101-3 [54], depending on E-UTRA NR band combination.
- NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [54], if applicable depending on E-UTRA NR band combination.
- NOTE 4: NR operating band groups are as defined in clause 3.5.
- NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [54] are applicable.

For FR2 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-2.

Table 10.1.21.1-2: PCell lo range conditions in FR2

Parameter	Minimum	Maximum Io				
Farailletei	dBm/ \$	SCS _{SSB}	dBm/BWchannel			
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	UDIII/DVV Channel			
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	50			
NOTE 2: Va 2 NOTE 3: In	NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.					

For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- RSRP_{|dBm} according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.
- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell lo range conditions

Davamatav	lo ^{Note 1} range								
Parameter —	E-UTRA operating band groups Note 3	Minimum Io	Maximum lo						
		dBm/15kHz Note 2	dBm/BW _{Channel}						
	FDD_A, TDD_A	-121	-50						
	FDD_C, TDD_C	-120	-50						
	FDD_D	-119.5	-50						
Conditions	FDD_E, TDD_E	-119	-50						
	FDD_F	-118.5	-50						
	FDD_G	-118	-50						
	FDD_H	-117.5	-50						
	FDD_N	-114.5	-50						

NOTE 1: When in dBm/15kHz, the minimum lo condition is expressed as the average lo per RE over all REs in that symbol. Io may be different in different symbols within a subframe.

NOTE 2: The condition level is increased by Δ>0, when applicable, as described in clauses B.4.2 and B.4.3 in TS36.133 [15].

NOTE 3: E-UTRA operating band groups are as defined in clause 3.5 in TS 36.133 [15].

Table 10.1.21.1-4: SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	> 2 4D	FR1			
40*64*Tc	≥-3 dB	FR2			

NOTE 1: To is the basic timing unit defined in TS 38.211 [6].

NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies.

10.1.21.2 SFTD acuracy requirements for NR-DC

The SFN and frame timing difference (SFTD) is measured between PCell in FR1 and PSCell in FR2 under NR dual connectivity.

The accuracy requirements in Table 10.1.21.2-3 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-1.

Table 10.1.21.2-1: PCell lo range conditions in FR1

	lo ^{Note 1} range									
	NR operating band groups Note 2	Minim	Minimum Io							
Parameter		dBm/								
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}						
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50						
	NR_FDD_FR1_B	-120.5	-117.5	-50						
	NR_TDD_FR1_C	-120	-117	-50						
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50						
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50						
	NR_FDD_FR1_G	-118	-115	-50						
	NR_FDD_FR1_H	-117.5	-114.5	-50						

NOTE 1: Io is assumed to have constant EPRE across the bandwidth. NOTE 2: NR operating band groups are as defined in clause 3.5.2.

For FR2 PSCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.2-2: PSCell lo range conditions in FR2

Parameter	Minimum	Maximum Io			
Parameter	dBm/ \$	SCS _{SSB}	dBm/BWchannel		
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 15 kHz SCS _{SSB} = 30 kHz			
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	50		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

Table 10.1.21.2-3: SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	≥ -3 dB	Between FR1 and FR2			
NOTE 1: Tc is the basic timir					
NOTE 2: The parameter Ês/I	ot is the minimum Ês/lot	of the pair of cells to which the			
requirement applies	S.				

10.1.21.3 Inter frequency SFTD acuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and inter-frequency neighbour cell.

The accuracy requirements in Table 10.1.21.3-3 are applicable under the following conditions:

For FR1 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-1.

Table 10.1.21.3-1: PCell, inter frequency neighbour cell lo range conditions in FR1

	lo	Note 1 range				
	NR operating band groups Note 2	Minim	Minimum Io			
Parameter		dBm/	SCS _{SSB}			
		SCS _{SSB} = 15	SCS _{SSB} = 30	dBm/BW _{Channel}		
		kHz	kHz			
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50		
	NR_FDD_FR1_B	-120.5	-117.5	-50		
	NR_TDD_FR1_C	-120	-117	-50		
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50		
	NR_FDD_FR1_G	-118	-115	-50		
	NR_FDD_FR1_H	-117.5	-114.5	-50		
NOTE 1: lo is	assumed to have constant EPRE across the bar	ndwidth.				
NOTE 2: NR	operating band groups are as defined in clause 3	152				

For FR2 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.3-2: PCell, inter frequency neighbour cell lo range conditions in FR2

		lo ^{Note 1} range					
Parameter	Minimum	lo Note 2, 3	Maximum Io				
Farailletei	dBm/ \$	dBm/BWchannel					
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	UDIII/DVV Channel				
Conditions Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle o arrival		Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	50				
NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.							

Table 10.1.21.3-3: Inter frequency SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
[40]*64*Tc	≥ [-3] dB	FR1, FR2			
NOTE 1: Tc is the basic timir					
NOTE 2: The parameter Ês/I		of the pair of cells to which the			
requirement applies	S.				

10.2 E-UTRAN measurements

10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC operation mode.

The requirements in clause 10.2 are applicable for a UE:

- in RRC_CONNECTED state
- performing measurements with appropriate measurement gaps according to clause 9.1.2.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR - E-UTRAN FDD and NR - E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

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

10.2.4 E-UTRAN RSTD measurements

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

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR — E-UTRAN FDD and inter-RAT NR — E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

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

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. +/-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 +/-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.3.1.1.1-1: 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-AdditionalPositions=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

Parameter	Unit		Value
Reference channel		SR.1.1 TDD	
Channel bandwidth	MHz	10	
Number of transmitter antennas		1	
Allocated resource blocks for PDSCH Note 1		24	
Allocated slots per Radio Frame			
Radio frame containing SSB	slots	Note 5	
Radio frame not containing SSB	slots	4	
MCS table		64QAM	
MCS index		4	
Modulation		QPSK	
Target Coding Rate		1/3	
Number of control symbols		2	
PDSCH mapping type		Type A	
Information Bit Payload			
For slots with RMSI Note 2	bits	1864	
Number of Code Blocks per slot		1	
Binary Channel Bits Per slot			
For slots with RMSI Note 2, 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-AdditionalPositions=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 SSB	slots	10			
MCS table		64QAM			
MCS index		4			
Modulation		QPSK			
Target Coding Rate		1/3			
Number of control symbols		2			
PDSCH mapping type		Type A			
Information Bit Payload					
For slots with RMSI Note 2	bits	1864			
Number of Code Blocks per slot		1			
Binary Channel Bits Per slot					
For slots with RMSI Note 2, Note 4	bits	6048			

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in 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 SSB	slots	48				
MCS table		64QAM				
MCS index		4				
Modulation		QPSK				
Target Coding Rate		1/3				
Number of control symbols		2				
PDSCH mapping type		Type A				
Information Bit Payload						
For slots with RMSI Note 2	bits	1864				
Number of Code Blocks per slot		1				
Binary Channel Bits Per slot						
For slots with RMSI Note 2, Note 4	bits	6048				

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in 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	kHz	15	
RMSI CORESET			
Allocated resource blocks		24	
for RMSI CORESET Note 7			
Subcarrier spacing for SSB	kHz	15	
SSB and RMSI		Pattern 1	
CORESET multiplexing			
configuration Note 7			
Offset between SSB and	RB	0 (Note8)	
RMSI CORESET Note 3, 7			
Configuration of PDCCH		Index 4	
monitoring occasions for RMSI CORESET Note 4			
Number of transmitter		1	
antennas		'	
Duration of RMSI	symbols	2	
CORESET Note 7	Symbols		
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder		6	
granularity			
REG bundle size		6	
Mapping from REG to		Distributed	
CCE			
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3]
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.2.2 TDD

Table A.3.1.2.2-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz

Parameter	Unit		Value
Reference channel		CR.1.1 TDD	
Channel bandwidth	MHz	10	
Subcarrier spacing	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
Index of transmitted 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 (Note 8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

Parameter	Unit		Value	!	
Reference channel		CR.2.1 TDD			
Channel bandwidth	MHz	40			
Subcarrier spacing	kHz	30			
Allocated resource blocks for RMSI CORESET Note 7		24			
Index of transmitted 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 (Note 8)			
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4			
Number of transmitter antennas		1			
Duration of RMSI CORESET Note 7	symbols	2			
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder granularity		6			
REG bundle size		6			
Mapping from REG to CCE		Distributed			
Cell ID		Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

Parameter	Unit			Value		
Reference channel		CR.3.1 TDD				
Channel bandwidth	MHz	100				
Subcarrier spacing	kHz	120				
Allocated resource blocks for RMSI CORESET Note 7		24				
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 (Note 8)				
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4				
Number of transmitter antennas		1				
Duration of RMSI CORESET Note 7	symbols	2				
DCI Format Note 1		Note 2				
Aggregation level	CCE	8				
DMRS precoder granularity		6				
REG bundle size		6				
Mapping from REG to CCE		Distributed				
Cell ID		Note 5				
Payload (without CRC)	bits	Note 6				

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-12 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-8 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.3 CORESET for RMC scheduling

FDD A.3.1.3.1

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

Parameter	Unit			Value		
Reference channel		CCR.1.1 FDD				
Channel bandwidth	MHz	10				
Subcarrier spacing	kHz	15				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbols	2				
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleaved				
Interleave n_shift		0				
Interleave size		2				
Beamforming Pre-Coder		N/A				
Aggregation level	CCE	8				
DCI formats		Note 1				
Payload size (without CRC)	bits	Note 2				

Note 1:

Note 2:

DCI format shall depend upon the test configuration.
Payload size shall depend upon the test configuration
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

Parameter	Unit			Value		
Reference channel		CCR.1.1 TDD				
Channel bandwidth	MHz	10				
Subcarrier spacing	kHz	15				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbols	2				
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleaved				
Interleave n_shift		0				
Interleave size		2				
Beamforming Pre-Coder	_	N/A				
Aggregation level	CCE	8				
DCI formats		Note 1	•			
Payload size (without CRC)	bits	Note 2				

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

Parameter	Unit			Value		
Reference channel		CCR.2.1 TDD				
Channel bandwidth	MHz	40				
Subcarrier spacing	kHz	30				
Allocated resource blocks for CORESET Note 3		24				
Number of transmitter antennas		1				
Duration of CORESET	symbols	2				
REG bundle size		6				
DMRS precoder granularity		Same as REG bundle size				
CCE to REG mapping		Interleaved				
Interleave n_shift		0				
Interleave size		2				
Beamforming Pre-Coder		N/A				
Aggregation level	CCE	8				
DCI formats		Note 1				
Payload size (without CRC)	bits	Note 2				

Note 1: DCI format shall depend upon the test configuration.

Note 2:

Payload size shall depend upon the test configuration.
Allocated in the same resource blocks where the associated RMC is scheduled. Note 3:

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

Parameter	Unit			Value		
Reference channel		CCR.3.1	CCR.3.2			
		TDD	TDD			
Channel bandwidth	MHz	100	100			
Subcarrier spacing	kHz	120	120			
Allocated resource blocks for CORESET Note 3		24	24			
Number of transmitter antennas		1	1			
monitoringSlotPeriodicityAndOffset		sl160	sl160			
		0	0			
monitoringSymbolsWithinSlot		1100000	0011000			
		0000000	0000000			
Duration of CORESET	slot	1	1			
REG bundle size		6	6			
		Same as	Same as			
DMRS precoder granularity		REG	REG			
Divirco proceder grandianty		bundle	bundle			
		size	size			
CCE to REG mapping		Interleaved	Interleaved			
Interleave n_shift		0	0			
Interleave size		2	2			
Beamforming Pre-Coder		N/A	N/A			
Aggregation level	CCE	8	8			
DCI formats		Note 1	Note 1			
Payload size (without CRC)	bits	Note 2	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 PDSCH 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='10DL:2GP:2UL'		
dl-UL-	ms	4		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		10		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dl-UL-	ms	1		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		0		
nrofUplinkSlot		0		
nrofUplinkSymbols		0		

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

Note 2: For information

Table A.3.1.4-2: TDD UL/DL configuration for SCS=30kHz

Parameter	Unit		Value	
Reference channel		TDDConf.2.1		
referenceSubcarrierSpacing	kHz	30		
TDD UL/DL pattern 1 Note 2		'3D1S4U' S='6DL:4GP:4UL'		
dI-UL-	ms	4		
TransmissionPeriodicity				
nrofDownlinkSlots		3		
nrofDownlinkSymbols		6		
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 2: For information

Table A.3.1.4-3: TDD UL/DL configuration for SCS=120kHz

Parameter	Unit		Value
Reference channel		TDDConf.3.1	
referenceSubcarrierSpacing	kHz	120	
TDD UL/DL pattern 1 Note 2		'DDDSU'	
		S='10DL:2GP:2UL'	
dI-UL-	ms	0.625	
TransmissionPeriodicity			
nrofDownlinkSlots		3	
nrofDownlinkSymbols		10	
nrofUplinkSlot		1	
nrofUplinkSymbols		2	
TDD UL/DL pattern 2 Note 2		Not configured	
dI-UL-	ms	Not configured	
TransmissionPeriodicity			
nrofDownlinkSlots		Not configured	
nrofDownlinkSymbols		Not configured	
nrofUplinkSlot		Not configured	
nrofUplinkSymbols		Not configured	
Note 1: As specified in TS 38.213	3 [3] and TS 3		I I

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

For information Note 2:

A.3.2 OFDMA channel noise generator (OCNG)

Generic OFDMA Channel Noise Generator (OCNG) A.3.2.1

The OCNG pattern is used in a test for modelling allocations of unused resources in the channel bandwidth to virtual UEs (which are not under test). The OCNG pattern comprises PDCCH and PDSCH transmissions to the virtual UEs.

A.3.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

Table A.3.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs

OCNG Parameters	Control Region	Data Region				
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)				
Channel	PDCCH	PDSCH				
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data				
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Aggregation level	Same as used in PDCCH RMC	N/A				
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC				
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the						

channel bandwidth of the cell.

A.3.2.1.2 OCNG pattern 2: Generic OCNG pattern for all unused REs for 2AoA setup

Table A.3.2.1.2-2: OP.2: Generic OCNG pattern for all unused REs for 2AoA setup

OCNG Parameters	Control Region	Data Region
Probe	Transmitting the serving beam	
Resource allocation	Unused REs (Note 1) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.	Unused REs (Note 2) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.

REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the Note 2: channel bandwidth of the cell.

No OCNG is transmitted from the probe transmitting non-serving beam.

A.3.2.2 Void

A.3.3 Reference DRX configurations

A.3.3.1 DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.1-1: DRX.1: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	40 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.2 DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.2-1: DRX.2: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	640 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.3 DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity

Table A.3.3.3-1: DRX.3: DRX cycle = 40 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	40 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for	or NR serving cell. The DRX cycle and time alignment
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.4 DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity

Table A.3.3.4-1: DRX.4: DRX cycle = 160 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf2
drx-RetransmissionTimer	Psf16
longDRX-CycleStartOffset	sf160, 0
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.5 DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.5-1: DRX.5: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf1920
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf320, 0
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.6 DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms

Table A.3.3.6-1: DRX.6: DRX cycle = 320 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	320 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.7 DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.7-1: DRX.7: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	640 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.8 DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.8-1: DRX.8: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	320 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.9 DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.9-1: DRX.9: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf100
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf40, 0
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.10 DRX Configuration 10: DRX cycle = 640 ms

Table A.3.3.10-1: DRX.10: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf1920
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf640, 0
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.11 DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity

Table A.3.3.11-1: DRX.11: DRX cycle = 20 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	20 ms
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.4 Test Cases with Different Channel Bandwidths

A.3.4.1 Test Cases with Different E-UTRA Channel Bandwidths

A.3.4.1.1 Introduction

In Annex A test cases involving E-UTRA cell(s) may be defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement.

A.3.4.1.2 Principle of testing

If multiple test cases involving E-UTRA cell(s) are defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement that is E-UTRA channel bandwidth independent, then the UE needs to be tested with only one channel bandwidth in each E-UTRA cell and with the same bandwidth in all the E-UTRA cells used in the test case.

A.3.5 Test Cases for Synchronous and Asynchronous DC Operations

A.3.5.1 EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations

A.3.5.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for EN-DC operation in synchronous and asynchronous scenarios.

In Annex A test cases may be defined in both synchronous EN-DC and asynchronous EN-DC scenarios to verify the same type of RRM requirement.

A.3.5.1.2 Principle of Testing

If EN-DC test cases are defined in both synchronous and asynchronous EN-DC scenarios to verify the same type of RRM requirement then the UE capable of both synchronous and asynchronous EN-DC operations needs to be tested with one of the tests in either synchronous or asynchronous EN-DC scenarios.

A.3.6 Antenna configurations

A.3.6.1 Antenna configurations for FR1

Unless otherwise specified, NR FDD or NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

A.3.6.1.1 Antenna connection for 4 Rx capable UEs

A.3.6.1.1.1 Introduction

All tests in 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

A.4.5.1.1 -18 N/A N/A N/A A.4.5.1.3 -18 N/A N/A N/A A.4.5.1.5 -18 N/A N/A N/A A.4.5.1.7 -18 N/A N/A N/A A.5.5.1.1 -18 N/A N/A N/A A.5.5.1.3 -18 N/A N/A N/A A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A A.7.5.1.7 -18 N/A N/A N/A					
A.4.5.1.5 -18 N/A N/A N/A A.4.5.1.7 -18 N/A N/A N/A A.5.5.1.1 -18 N/A N/A N/A A.5.5.1.3 -18 N/A N/A N/A A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.4.5.1.1	-18	N/A	N/A	N/A
A.4.5.1.7 -18 N/A N/A N/A A.5.5.1.1 -18 N/A N/A N/A A.5.5.1.3 -18 N/A N/A N/A A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.4.5.1.3	-18	N/A	N/A	N/A
A.5.5.1.1 -18 N/A N/A N/A A.5.5.1.3 -18 N/A N/A N/A A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.4.5.1.5	-18	N/A	N/A	N/A
A.5.5.1.3 -18 N/A N/A N/A A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.4.5.1.7	-18	N/A	N/A	N/A
A.5.5.1.5 -18 N/A N/A N/A A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.5.5.1.1	-18	N/A	N/A	N/A
A.5.5.1.7 -18 N/A N/A N/A A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.5.5.1.3	-18	N/A	N/A	N/A
A.6.5.1.1 -18 N/A N/A N/A A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.5.5.1.5	-18	N/A	N/A	N/A
A.6.5.1.3 -18 N/A N/A N/A A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.5.5.1.7	-18	N/A	N/A	N/A
A.6.5.1.5 -18 N/A N/A N/A A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.6.5.1.1	-18	N/A	N/A	N/A
A.6.5.1.7 -18 N/A N/A N/A A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.6.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.1 -18 N/A N/A N/A A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.6.5.1.5	-18	N/A	N/A	N/A
A.7.5.1.3 -18 N/A N/A N/A A.7.5.1.5 -18 N/A N/A N/A	A.6.5.1.7	-18	N/A	N/A	N/A
A.7.5.1.5 -18 N/A N/A N/A	A.7.5.1.1	-18	N/A	N/A	N/A
	A.7.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.7 -18 N/A N/A N/A	A.7.5.1.5	-18	N/A	N/A	N/A
	A.7.5.1.7	-18	N/A	N/A	N/A

Table A.3.6.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

Test case	SNR dur	SNR during T3 (dB)		SNR during T4 (dB)	
	Test 1	Test 2	Test 1	Test 2	
A.4.5.1.2	-18	N/A	-8	N/A	
A.4.5.1.4	-18	N/A	-8	N/A	
A.4.5.1.6	-18	N/A	-8	N/A	
A.4.5.1.8	-18	N/A	-8	N/A	
A.5.5.1.2	-18	N/A	-8	N/A	
A.5.5.1.4	-18	N/A	-8	N/A	
A.5.5.1.6	-18	N/A	-8	N/A	
A.5.5.1.8	-18	N/A	-8	N/A	
A.6.5.1.2	-18	N/A	-8	N/A	
A.6.5.1.4	-18	N/A	-8	N/A	
A.6.5.1.6	-18	N/A	-8	N/A	
A.6.5.1.8	-18	N/A	-8	N/A	
A.7.5.1.2	-18	N/A	-8	N/A	
A.7.5.1.4	-18	N/A	-8	N/A	
A.7.5.1.6	-18	N/A	-8	N/A	
A.7.5.1.8	-18	N/A	-8	N/A	

Table A.3.6.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection

Test case	SNR during T3 (dB)	
	Test 1	

A.4.5.5.1	-15
A.4.5.5.2	-15
A.4.5.5.3	-15
A.4.5.5.4	-15
A.5.5.5.1	-15
A.5.5.5.2	-15
A.5.5.5.3	-15
A.5.5.5.4	-15
A.6.5.5.1	-15
A.6.5.5.2	-15
A.6.5.5.3	-15
A.6.5.5.4	-15
A.7.5.5.1	-15
A.7.5.5.2	-15
A.7.5.5.3	-15
A.7.5.5.4	-15

A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in 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 remaining 2 Rx ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.5 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in sections A.3.6.1.1.2.1 and A.3.6.1.1.2.2, no test parameters or requirements are modified.

A.3.6.1.1.2.6 EN-DC LTE Antenna connection for bands where 2RX is supported

For bands where LTE 2RX is supported, it is left to the UE declaration and AP configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 Rx ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.7 EN-DC LTE Antenna connection for bands where 4RX is supported

For bands where LTE 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for

the modifications to radio link monitoring thresholds described in sections A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, 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 or in any test case comprising at least one E-UTRA serving cell with all NR cells in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the NR carrier. The E-UTRA PCell shall configured to not interfere with NR operation and the E-UTRA PCell signal power shall not be critical to the test purpose.

Table A.3.7.2.1-1: E-UTRAN cell specific test parameters for tests with all NR cells in FR1

Parameter	Unit	E-UTRAN Cell1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}		5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	0

PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104
Ê _s /N _{oc}	dB	17
Ês/lot	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
lo Note5	dBm/Ch BW	-59.13+10log(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
N	P 1 C C	''' 1' ' 11 1 1 1 1 TO 00 011

- 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 N_{oc} to be fulfilled
- Note 5: E_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.3.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

Table A.3.7.2.2-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with one or more NR cells in FR2.

Table A.3.7.2.2-1: E-UTRAN cell specific test parameters for tests with one or more NR cells in FR2

Parameter	Unit	E-UTRAN Cell1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}	MHz	5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD

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	5 MHz: OP.20 FDD
	10 MHz: OP.10 FDD
	20 MHz: OP.17 FDD
	5 MHz: OP.9 TDD
	10 MHz: OP.1 TDD
	20 MHz: OP.7 TDD
dB	
dB	0
dB	
	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.3.7A NR FR1-FR2 test setup

Some Test cases in clause A.7 have NR cells in both FR1 and FR2. Unless otherwise stated within the test, the NR FR1 Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free NR FR1 signal without need of precise propagation modelling, path loss and polarization control. Further details of the NR FR1 signal configuration are not defined as part of the cell specific test parameters, since the NR FR1 link is not under performance verification and is not expected to influence the test purpose.

A.3.8 PRACH configurations

A.3.8.1 Introduction

This 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	102	10ms PRACH periodicity, and other detailed
		configuration defined in table 6.3.3.2-2 and table 6.3.3.2-
		3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL	
	carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based
		and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence =
		1.
ssb-perRACH-OccasionAndCB-	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions
PreamblesPerSSB		n48: 48 contention based preambles per SSB
msg1-FDM	One	One PRACH transmission occasions FDMed in one time
		instance.
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined
		in TS 38.331 [2].
ra-ContentionResolutionTimer	sf48	48 sub-frames
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed
		before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].
Note: For further information se	ee clause 6.3.2 in T	S 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	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE doesn't use this field if is transmitting CFRA to convey BFR.	
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE uses this field only if is transmitting CFRA to convey BFR	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.3 FR1 PRACH configuration 3

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

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

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, 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	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2].	

A.3.8.2.4 FR1 PRACH configuration 4

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

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

Field	Value	Comment
prach-ConfigurationIndex	8	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n200	Max number of RA preamble transmission performed before declaring a failure is 200
ra-ResponseWindow	sl1	1 slot
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 93
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]].

A.3.8.3 PRACH configurations in FR2

A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this 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	190	Preamble Format C2, with 10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-4 in TS 38.211 [6].		
msg1-SubcarrierSpacing	Same as UL carrier SCS			
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access		
numberOfRA-PreamblesGroupA	48	No group B.		
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.		
ssb-perRACH-OccasionAndCB- PreamblesPerSSB	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB		
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.		
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].		
ra-ContentionResolutionTimer	sf48	48 sub-frames		
powerRampingStep	dB2			
preambleReceivedTargetPower	dBm-120			
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6		
ra-ResponseWindow	sl10	10 slots		
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23		
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS 38.321 [7].		
Note: For further information s	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	190	Preamble Format C2, with 10ms PRACH	
		periodicity, and other detailed configuration	
		defined in table 6.3.3.2-4 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for	
		contention based and contention free	
		random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root	
		sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH	
mand FDM	One	occasions One PRACH transmission occasions	
msg1-FDM	One	FDMed in one time instance.	
powerRampingStep	dB2	FDIVIEW III ONE UITIE INSTANCE.	
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission	
preamble transitiax	110	performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS	
		38.321 [7].	
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE doesn't	
		use this field if is transmitting CFRA to	
		convey BFR.	
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE uses	
		this field only if is transmitting CFRA to	
		convey BFR	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -	
		105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3.3 FR2 PRACH configuration 3

FR2 PRACH configuration 3 in this section provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random acces
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission
		performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]	ļ

A.3.8.3.4 FR2 PRACH configuration 4

 $FR2\ PRACH\ configuration\ 4\ in\ this\ section\ provides\ the\ PRACH\ configuration\ for\ CSI-RS\ based\ non-contention\ based\ random\ access\ in\ FR2\ to\ convey\ BFR.$

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n200	Max number of RA preamble transmission
		performed before declaring a failure is 200.
ra-ResponseWindow	sl40	40 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]].

A.3.9 BWP configurations

A.3.9.1 Introduction

This 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	RB _a Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	
Note 1: RB _a 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.3.9.2.2 Dedicated BWP

Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values			
Reference BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3	
Starting PRB index		0	RB _b Note 1	RB _a 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	Note 1: RB _b is the lowest PRB index to guarantee the BWP not fully overlapped with SSB				
PRB index	(RB _J , R	RB _{J+1} ,, RB _{J+19}) which is defined in Section A.3.10.			
		PRB index to guarantee the BWP including SSB PRB index			
(RB _J , RB _{J+}	1,, RI	,, 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 CORESET (CORESET #0) defined in each test	
Note 1: RBa is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RB _J , RB _{J+1} ,, RB _{J+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 Pa	rameters	Unit	Values		
Reference	e BWP		ULBWP.1.1	ULBWP.1.2	ULBWP.1.3
Starting F	PRB index		0 RB _b Note 1 RB _a Note 2		RBa Note 2
Bandwidt	h	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:	RBa is the	lowest F	est PRB index to guarantee the BWP including SSB PRB index ., RB _{J+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 (RBJ, RBJ+1,, RBJ+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 [43]		

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	3	30 kHz	
SSB peri	odicity	20 ms	
Number	of SSBs per SS-burst	1	
SS/PBCH	H block index	0	
Indices of symbols containing SSB 4-7 or 2-5 Note 2			
Indices of of slots containing SSB		0	
RB numbers containing SSB within channel BW (RB _J , RB _{J+1} ,, RB _{J+19}) ^{Not}		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1:	bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2:	Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.		

A.3.10.1.3 SSB pattern 3 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	3	15 kHz		
SSB perio	odicity	20 ms		
Number of SSBs per SS-burst 2		2		
SS/PBCH block index		0	1	
Symbol numbers of symbols containing SSB		2-5	8-11	
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)		J+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.3.10.1.4 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 SC	3	30 kHz	0 kHz	
SSB peri	odicity	20 ms		
Number of SSBs per SS-burst 2				
SS/PBCI	H block index	0 1		
Symbol numbers of symbols containing SSB		4-7 or 2-5 Note 2	8-11	
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)Note 1			RB _{J+19})Note 1	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].				
Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.				

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	100 MHz		
SSB SCS	120 kHz			
SSB periodicity	20 ms			
Number of SSBs per SS-burst	2	2		
SS/PBCH block index	0	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 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.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values		
Channel bandwidth	100 MHz			
SSB SCS	240 kHz			
SSB periodicity	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 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		
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		
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.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	
Channel bandwidth	100 MH	lz	
SSB SCS	120 kHz	Z	
SSB periodicity	20 ms		
Number of SSBs per SS-burst 2			
SS/PBCH block index	2 3		
Indices of symbols containing SSBs	2-5	6-9	
Indices of slots containing SSB	1	1	
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.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	1	Values	
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity	20 ms	20 ms	
Number of SSBs per SS-burst	2		
SS/PBCH block index	2	3	
Indices of symbols containing SSBs	2-5	6-9	
Indices of slots containing SSB	1	1	
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.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values		
Channel bandwidth	100 MHz		
SSB SCS	120 kHz		
SSB periodicity	20 ms		
Number of SSBs per SS-burst	1		
SS/PBCH block index	1		
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.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB 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	1		
Indices of symbols containing SSBs 12-13, 0-1			
Indices of slots containing SSB 0, 1			
RB numbers containing SSBs within channel BW (RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}			
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			

A.3.11 SMTC Configurations

A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.1-1: SMTC.1: SMTC Pattern 1 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.2-1: SMTC.2: SMTC Pattern 2 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	5 ms

A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms

Table A.3.11.3-1: SMTC.3: SMTC Pattern 3 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	160 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.4-1: SMTC.4: SMTC Pattern 4 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values	
SMTC periodicity	20 ms	
SMTC offset	10 ms	
SMTC duration	1 ms	

A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.4-1: SMTC.5: SMTC Pattern 5 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	5 ms

A.3.12 Test Cases with Different CC Configurations

A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations

A.3.12.1.1 Introduction

In Annex A EN-DC test cases may be defined for two component carriers (CCs) as well as for more than two CCs to verify the same RRM requirement.

A.3.12.1.2 Principle of testing

If multiple EN-DC test cases are defined for two CCs as well as for more than two CCs to verify the same type of RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with the maximum number of CCs in EN-DC supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with two CCs in EN-DC supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations

A.3.12.2.1 Introduction

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

A.3.12.2.2 Principle of testing

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with the maximum number of CCs in CA supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with at least two CCs in CA supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in CA would depend on the test equipment capability.

A.3.13 Test Cases in SA and EN-DC Operations

A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

Editor's note: this section may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.

A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and
- verifies at least all RRM requirements covered in the test case(s), which is not performed.

A.3.14 CSI-RS configurations

A.3.14.1 FDD

Table A.3.14.1-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 FDD	CSI-RS.1.2 FDD	CSI-RS.1.3 FDD	CSI-RS.1.4 FDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				22.6
nzp-CSI-RS-Resourceld	0 for resource #0	10 for resource #0	20 for resource #0	30 for resource #0 31 for resource #1 32 for resource #2 33 for resource #3
nzp-CSI-RS-Resourceid	o for resource #0	11 for resource #1	21 for resource #1	34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot5	slot10	n.a.	n.a.
Offset	1	1	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
firstOFDMSymbollnTimeDomain	5 for resource #0	6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
inster blweymbolii riineboliidiii	3 for resource #0	10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
	0	0	0	0

nrofRBs	276	276	276	276

A.3.14.2 TDD

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

	CSI-RS.1.1 TDD	CSI-RS.1.2 TDD	CSI-RS.1.3 TDD	CSI-RS.1.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
nzp-CSI-RS-Resourceld	0 for resource #0	10 for resource #0	20 for resource #0	30 for resource #0 31 for resource #1 32 for resource #2 33 for
		11 for resource #1	21 for resource #1	resource #3 34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot5	slot10	n.a.	n.a.
Offset	1	1	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
firstOFDMSymbolInTimeDomain		6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
		10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7

cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

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

	CSI-RS.2.1 TDD	CSI-RS.2.2 TDD	CSI-RS.2.3 TDD	CSI-RS.2.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		10 for resource #0	20 for resource #0	30 for resource #0 31 for resource #1 32 for resource #2 33 for
nzp-CSI-RS-ResourceId	0 for resource #0	11 for resource #1	21 for resource #1	resource #3 34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot10	slot20	n.a.	n.a.
Offset	2	2	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts		1	1	1
		6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
moter sweymbollin interesting	SymbolInTimeDomain 5 for resource #0		10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7

cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

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

	CSI-RS.3.1 TDD	CSI-RS.3.2 TDD	CSI-RS.3.3 TDD	CSI-RS.3.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	6	6
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		10 for resource #0	20 for resource #0	30 for resource #0 31 for resource #1 32 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0			33 for resource #3
		11 for resource #1	21 for resource #1	34 for resource #4 35 for resource #5 36 for resource #6 37 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot40	slot80	n.a.	n.a.
Offset	8	8	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	000001	000001	000001
nrofPorts	2	1	1	1
				0 for resource #0 1 for resource
		6 for resource #0	6 for resource #0	#1 2 for resource #2 3 for resource
firstOFDMSymbolInTimeDomain	5 for resource #0			#3 4 for resource #4
		10 for resource #1	10 for resource #1	5 for resource #5 6 for resource
				#6 7 for resource #7

cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276	276	276	276

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 active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table 3.15.3-1: Set of relative angular offsets between active probes for each power class

UE Power class	Relative angular offset between active probes
1	FFS
2	FFS
3	30°, 60°, 90°, 120° and 150°
4	FFS

A.3.16 TCI State Configuration

A.3.16.1 Introduction

This section provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this section are configured in each test when applicable to indicate that certain DL signals are QCL'ed with the referenceSignal configured in the TCI states.

A.3.16.2 TCI states

Table A.3.16.2-1: TCI States

Parameter	TCI.State.0	TCI.State.1	TCI.State.2	TCI.State.3	
tci-StateId	ld0	ld1	ld2	ld3	
qcl-Type1	typeC	typeC	typeA	typeA	
qcl-Type2 ^{Note1}	typeD	typeD	typeD	typeD	
referenceSignal	SSB0	SSB1	Resource #4 in TRS resource set 1 Note3	Resource #4 in TRS resource set 2 Note3	
Note 1: qcl-Type2 of typeD only where applicable. For RRM test cases, this will be only in FR2 Note 2: referenceSignal configurations towards which the TCI states are configured are defined in a test-					

specific manner.

Note 3: Reference TRS resource sets are defined in A.3.17, and the applicable TRS resource set(s) are specified in each test case. When a single TRS resource set is configured in a test case, it is considered as resource set 1.

Table A.3.16.2-2: Void

A.3.17 Configurations of CSI-RS for tracking

A.3.17.1 Configuration of CSI-RS for tracking for FR1

A.3.17.1.1 **FDD**

Table A.3.17.1.1-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value
Reference channel		TRS.1.1 FDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	15
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		I ₀ = 6 for CSI-RS resource 1 and 3
CSI-RS		l ₀ = 10 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2
CSI-RS dilset	SIOTS	11 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

Table A.3.17.1.1-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value
Reference channel		TRS.1.2 FDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	30
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		l ₀ = 6 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 10 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	20 for CSI-RS resource 1 and 2
CSI-RS offset	SIOIS	21 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value
Reference channel		TRS.1.1 TDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	15
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		l ₀ = 6 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 10 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2
CSI-RS dilset	SIOTS	11 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value
Reference channel		TRS.1.2 TDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	30
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		l ₀ = 6 for CSI-RS resource 1 and 3
CSI-RS		l ₀ = 10 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4
CSI-RS offset	alata	20 for CSI-RS resource 1 and 2
CSI-RS Offset	slots	21 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

A.3.17.2 Configuration of CSI-RS for tracking for FR2

A.3.17.2.1 TDD

Table A.3.17.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1

Parameter	Unit	Value
Reference channel		TRS.2.1 TDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	120
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		l ₀ = 1 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 5 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2
CSI-RS Offset	SIOIS	41 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
TCI state		TCI.State.0
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

Parameter	Unit	Value
Reference channel		TRS.2.2 TDD
Bandwidth		BW of Active BWP ^{Note}
SCS	kHz	120
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the PRB used for		l ₀ = 2 for CSI-RS resource 1 and 3
CSI-RS		l ₀ = 6 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2
CSI-RS dilset	SIOIS	41 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	-3
TCI state		TCI.State.1
Note: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases		

A.4 EN-DC tests with all NR cells in FR1

A.4.1 Void

A.4.2 Void

A.4.3 RRC_CONNECTED state mobility

A.4.3.1 Void

A.4.3.2 RRC Connection Mobility Control

A.4.3.2.1 Void

A.4.3.2.2 Random Access

A.4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in 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, 10 MHz bandwidth, FDD duplex mode	
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE	
	capability		

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

SSB Configuration Config 1,2 Config 3,4 SSB pattern 1 in FR1 SSB pattern 2 in FR1 SSB pattern 2 in FR1 SSB per SS-burst SS/PBCH block index SS/PBCH block index O,1 Different from th definition in A.3.1 Duplex Mode for Cell 2 Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2 OCNG Pattern Note 1 SSB pattern 1 in FR1 As defined in A.3. except for number sSBs per SS-burst O,1 Different from th definition in A.3.1 TDDConfiguration Config 3,4 TDDConf.1.2 OCNG pattern 1 As defined in A.3.
SSBs per SS-burst SS/PBCH block index
SS/PBCH block index SS/PBCH block index
Number of SSBs per SS-burst 2 Different from th definition in A.3.1 SS/PBCH block index 0,1 Different from th definition in A.3.1 Duplex Mode for Cell 2 Config 1,2 FDD Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2
Number of SSBs per SS-burst 2 Different from th definition in A.3.1 SS/PBCH block index 0,1 Different from th definition in A.3.1 Duplex Mode for Cell 2 Config 1,2 FDD Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2
SS/PBCH block index
SS/PBCH block index 0,1 Different from the definition in A.3.1 Duplex Mode for Cell 2 Config 1,2 FDD Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2
Duplex Mode for Cell 2 Config 1,2 FDD
Duplex Mode for Cell 2 Config 1,2 FDD Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2
Config 3,4 TDD TDD Configuration Config 3,4 TDDConf.1.2
TDD Configuration Config 3,4 TDDConf.1.2
OCNG Pattern Note 1 OCNG pattern 1 As defined in A.3.2
PDSCH parameters Config 1,2 SR.1.1 FDD As defined in A.3.1
Note 4 Config 3,4 SR.2.1 TDD
NR RF Channel Number 1
EPRE ratio of PSS to SSS 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
EPRE ratio of PDCCH to PDCCH_DMRS dB
EPRE ratio of PDSCH_DMRS to SSS dB
EPRE ratio of PDSCH to PDSCH_DMRS dB
\hat{E}_s/I_{ot} dB 3 Power of SSB with i
SSB with index 0 N_{oc} Config 1,2 dBm/15kHz -98 configured rsrp-
Config 3,4 -101 ThresholdSSB
\hat{E}_s/N_{oc} dB 3
SS-RSRP Note 3 dBm/ SCS -95
\hat{E}_s/I_{ot} dB -17 Power of SSB with i
SSB with index 1 N_{oc} Config 1,2 dBm/15kHz -98 and configured rsrp-
Config 3,4 -101 ThresholdSSB
\hat{E}_s/N_{oc} dB -17
SS-RSRP Note 3 dBm/ SCS -115
Config 1,2 dBm -65.3/9.36MHz For symbols without
Config 3,4 -62.2/38.16MHz index 1

ss-PBCH-BlockPower	dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\mathrm{CMAX, f.c}}$)	dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration		FR1 PRACH configuration 1	As defined in A.3.8.2.
Propagation Condition	-	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.4.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in 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 an UL grant for msg3 retransmission

To test the UE behavior specified in subclause 6.2.2.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.4.3.2.2.1.2.5 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, 10 MHz bandwidth, FDD duplex mode	
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only re capability		equired to be tested in one of the supported test configurations depending on UE	

Table A.4.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

Parameter		Unit	Test-1	Test-2	Comments	
SSB Configura	ition	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
						index as below
Number of SSI	Bs per SS	-burst		2	2	Different from the
						definition in A.3.10
SS/PBCH bloc	k index			0,1	0,1	Different from the
		T =				definition in A.3.10
CSI-RS Config	uration	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
		Config 3,4			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode f	or Cell 2	Config 1,2		FDD	FDD	
		Config 3,4		TDD	TDD	
TDD Configura		Config 3,4		TDDConf.1.2	TDDConf.1.2	
OCNG Pattern	Note 1			OCNG pattern 1	OCNG pattern 1	As defined in
		1 .				A.3.2.1.
PDSCH param	eters	Config 1,2		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 3,4		SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
NR RF Channe				1	1	
EPRE ratio of I			dB			
EPRE ratio of I			dB			
EPRE ratio of I			dB			
EPRE ratio of I			dB	0	0	
		PDCCH_DMRS	dB			
EPRE ratio of I			dB			
EPRE ratio of I	PDSCH to	PDSCH_DMRS	dB			
SSB with	L_s/I_{ot}		dB	3	3	Power of SSB with
index 0		Config 1,2	dBm/15kHz	-98	-98	index 0 is set to be
	N_{oc}	Config 3,4		-101	-101	above configured rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}	<u> </u>	dB	3	3	,
	SS-RSRP Note 3		dBm/ SCS	-95	-95	
	\hat{E}_s/I_{ot}		dB	-17	-17	

	N_{aa}	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	Power of SSB with
SSB with	00	Config 3,4		-101	-101	index 1 is set to be	
index 1	\hat{E}_s/N_{oc}		dB	-17	-17	below configured	
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	rsrp-ThresholdSSB	
Note 2		Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without	
10	Config 3,4]	-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1	
			dBm/ SCS	-5	-5	As defined in clause	
ss-PBCH-Blo	ockPower					6.3.2 in TS 38.331	
						[2].	
Configured U	JE transmitt	ed power (dBm	23	23	As defined in clause	
$P_{\text{CMAX, f,c}}$)						6.2.4 in TS 38.101-	
CMAX, 1,C					1.		
PRACH Configuration			FR1 PRACH	FR1 PRACH	As defined in		
	5			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: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in 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 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	LTE FDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	LTE FDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	LTE FDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
4	LTE TDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
5	LTE TDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
6	LTE TDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE	is only required to be tested in one of the supported test configurations

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Table A.4.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.4.4.1.1.1-3.

Table A.4.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2,3,4,5,6	Freq1	Freq1	
Duplex Mode		1,4	FDD		
Duplex Mode		2,3,5,6	TDD		
		1,4	Not Ap	plicable	
TDD configuration		2,5	TDDC	TDDConf.1.1	
		3,6	TDDC	onf.1.2	
		1,4	10: NR	B,c = 52	
BWchannel	MHz	2,5	10: N _R	_{B,c} = 52	
		3,6	40: N RI	s,c = 106	
Initial BWP Configuration		1,2,3,4,5,6		VP.0.1 VP.0.1	
Dedicated BWP Configuration		1,2,3,4,5,6		VP.1.1 VP.1.1	
DRx Cycle	ms	1,2,3,4,5,6	N/A	DRX.5 ^{Note5}	
DD00H D-(1,4	SR.1.1 FDD SR.1.1 TDD		
PDSCH Reference measurement channel		2,5			
measurement charmer		3,6	SR.2.1 TDD		
CORESET Reference		1,4	CR.1.1 FDD CR.1.1 TDD		
Channel		2,5			
		3,6	CR.2.1 TDD		
OCNG Patterns		1,2,3,4,5,6	OCNG	pattern 1	
		1,4	SSB.	1 FR1	
SSB configuration		2,5	SSB.1 FR1		
		3,6		2 FR1	
SMTC configuration		1,2,3,4,5,6	SMTC.2		
		1,4		.1 FDD	
TRS configuration		2,5		.1 TDD	
		3,6	TRS.1	.2 TDD	
PDSCH/PDCCH	kHz	1,2,4,5	1	5	
subcarrier spacing	1312	3,6	3	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 to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	dB	1,2,3,4,5,6	0	0	
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	1,2,3,4,5,6	-98	-98	
N_{oc} Note2	dD/000	1,2,4,5	-98	-98	
1 voc	dBm/SCS	3,6	-95	-95	
\hat{E}_{s}/I_{ot}		1,2,3,4,5,6	3	3	
\hat{E}_s/N_{oc}		1,2,3,4,5,6	3	3	
SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-95	-95	
	ubiii/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	AWGN		
SRS Config		1,2,4,5	Config1 ^{Note6}	Config3 ^{Note6}	
		3, 6	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.3.3.5-1

Note 6: SRS configs are given in Table A.4.4.1.1.1-3

Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Config 3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	0	
	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	

1	1	1	1	
resourceMapping	0	0	0	
startPosition				
resourceMapping	n1	n1	n1	
nrofSymbols				
resourceMapping	n1	n1	n1	
repetitionFactor				
freqDomainPosition	0	0	0	
freqDomainShift	0	0	0	
freqHopping	sl1	sl1	sl1	
c-SRS				
freqHopping	0	0	0	
b-SRS				
freqHopping	0	0	0	
b-hop				
groupOrSequenceHopping	Neither	Neither	Neither	
resourceType	Periodic	Periodic	Periodic	
periodicityAndOffset-p	sl1, 0	sl640, 0	sl320, 0	Offset to align with
				DRx periodicity
sequenceld	0	0	0	Any 10 bit number

A.4.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 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)	Adjustment Value	
	Test1	Test2
15	+64*64T _c	+32*64T _c
30	+32*64T _c	+16*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Section 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c \pm T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.4.4.2 UE timer accuracy

A.4.4.3 Timing advance

A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

A.4.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in 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 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

Table A.4.4.3.1.2-1: Timing advance supported test configurations

Table A.4.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	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	For 15 kHz SCS NTA_new = NTA_old + 8192*Tc For 30 kHz SCS NTA_new = NTA_old + 4096*Tc (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

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

Parameter		Unit	Test1			
Faiaiii	- arailleter		T1	T2		
Duplex mode	Config 1,4		FC	DD		
Duplex mode	Config 2,3,5,6		TC	DD		
	Config 1,4		Not Applicable			
TDD configuration	Config 2,5		TDDCc	onf.1.1		
	Config 3,6		TDDCc			
	Config 1,4		10: N _{RE}			
BW _{channel}	Config 2,5	MHz	10: N _{RE}	a,c = 52		
	Config 3,6		40: N _{RB} ,	c = 106		
	Config 1,4		10: N _{RE}	a,c = 52		
BWP BW	Config 2,5	MHz	10: N _{RE}	3,c = 52		
	Config 3,6		40: $N_{RB,c} = 106$			
DRx Cycle		ms	Not App	olicable		
DDCCII Deference	Config 1,4		SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2,5	7	SR.1.1 TDD			
measurement channel	Config 3,6	7	SR2.1 TDD			
CORESET Reference	Config 1,4		CR.1.1 FDD			
Channel	Config 2,5		CR.1.1 TDD			
Charlie	Config 3,6		CR2.1 TDD			
	Config 1,4		TRS.1.1 FDD			
TRS configuration	Config 2,5		TRS.1.1 TDD			
	Config 3,6		TRS.1.2 TDD			
OCNG Patterns			OCNG p	attern 1		
SMTC configuration	Config 1,2,4,5		SMTC.	1 FR1		
Sivi i C configuration	Config 3,6		SMTC.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5	kHz	15 kHz			
subcarrier spacing	Config 3,6	KITZ	30 kHz			
PUCCH/PUSCH Config 1,2,4,5		kHz	15 k	(Hz		
subcarrier spacing	Config 3,6	NI IZ	30 kHz			
EPRE ratio of PSS to S	SS	dB	C			
EPRE ratio of PBCH DN	IRS to SSS	QD.	U			

EPRE rati	o of PBCH to PBCH DMRS		
EPRE rati	o of PDCCH DMRS to SSS		
EPRE rati	o of PDCCH to PDCCH DMRS		
EPRE rati	o of PDSCH DMRS to SSS		
EPRE rati	o of PDSCH to PDSCH		
EPRE rati	o of OCNG DMRS to SSS(Note 1)		
EPRE rati	o of OCNG to OCNG DMRS (Note		
1)			
$N_{oc}^{\rm Note2}$		dBm/15kH	-98
IV oc		Z	-90
N_{oc} Note2	Config 1,2,4,5		-98
oc oc	Config 3,6	dBm/SCS	-95
\hat{E}_{s}/I_{ot}		dB	3
\hat{E}_s/N_{oc}		dB	3
IoNote3	Config 1,2,4,5	dBm/ 9.36MHz	-67.57
10 _{More2}	Config 3,6	dBm/ 38.16MHz	-62.58
Propagation	on condition	-	AWGN
N	0.010 1 11 1 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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment		
c-SRS	Config 1,2,4,5	12			
U-3K3	Config 3,6	24	Frequency 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-Periodic	SRS-PeriodicityAndOffset		Once every 5 slots		
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation		
usa	age	Codebook	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 setting		
cyclicShift-n2 nrofSRS-Ports		0	transmissionComb setting		
		port1	Number of antenna ports used for SRS transmission		
Note: For further information see clause 6.3.2 in TS 38.331 [2].					

A.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.4.5 Signaling characteristics

A.4.5.1 Radio link Monitoring

In the following 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 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

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 1.

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

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

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

Parameter			Unit	Value
				Test 1
Active E-UTRA PCell				Cell 1
	E-UTRA RF Channel Number			1
Active PSCell				Cell 2
RF Channel Nu	mber			2
Duplex mode		Config 1, 4		FDD
		Config 2, 3, 5, 6		TDD
BW _{channel}		Config 1, 4	MHz	10: $N_{RB,c} = 52$
		Config 2, 5		10: $N_{RB,c} = 52$
		Config 3, 6		40: $N_{RB,c} = 106$
DL initial BWP		Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
configuration				DEDWI .0.1
DL dedicated B' configuration	WP	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP		Config 1, 2, 3, 4, 5, 6		
configuration		Coning 1, 2, 3, 4, 3, 0		ULBWP.0.1
UL dedicated B	MΡ	Config 1, 2, 3, 4, 5, 6		
configuration	V V I	Coming 1, 2, 3, 4, 3, 0		ULBWP.1.1
TDD Configurat	ion	Config 1, 4		Not Applicable
		Config 2, 5		TDDConf.1.1
		Config 3, 6		TDDConf.2.1
CORESET Refe	erence	Config 1, 4		CR.1.1 FDD
Channel		Config 2, 5		CR.1.1 TDD
		Config 3, 6		
SSB Configurat	ion	Config 1, 4		SSB.1 FR1
		Config 2, 5		SSB.1 FR1
		Config 3, 6		SSB.2 FR1
SMTC Configura	ation	Config 1, 2, 4, 5		SMTC.1
		Config 3, 6		SMTC.1
PDSCH/PDCCH	+	Config 1, 2, 4, 5		15 kHz
subcarrier spaci	ing	Config 3, 6		30 kHz
PRACH Configu	ıration	Config 1, 2, 4, 5		Table A.3.8.2.4-1
_		Config 3, 6		Table A.3.8.2.4-1
SSB index assign	gned as R	LM RS		0
OCNG parameters				OP.1
CP length				Normal
Correlation Matrix and Antenna Configuration			2x2 Low	
Out of sync				1-0
transmission	Number of Control OFDM symbols			2
parameters	Aggrega	ation level	CCE	8
	Ratio of	hypothetical PDCCH RE	dB	4
	energy t	o average SSS RE energy		

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE		dB	4	
 -	energy DMRS or	ecoder granularity		REG bundle size	
	REG bun	<u> </u>		6	
DRX	IXEO DUII	010 0120		OFF	
Gap pattern ID				gp0	
Layer 3 filtering				Enabled	
T310 timer			ms	0	
T311 timer			ms	1000	
N310				1	
N311				1	
CSI-RS for CSI re	eporting	Config 1, 4		CSI-RS.1.1 FDD	
		Config 2, 5		CSI-RS.1.1 TDD	
		Config 3, 6		CSI-RS.2.1 TDD	
CSI-RS for tracki	ng	Config 1, 4		TRS.1.1 FDD	
		Config 2, 5		TRS.1.1 TDD	
		Config 3, 6		TRS.1.2 TDD	
T1			S	0.2	
T2			S	0.48	
T3			S	0.48	
D1	D1			0.44	
Note 2: UE-sp	Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

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

F	Unit		Test 1		
			T1	T2	Т3
EPRE ratio of P	DCCH DMRS to SSS	dB		4	
EPRE ratio of P DMRS	DCCH to PDCCH	dB	0		
EPRE ratio of P	BCH DMRS to SSS	dB			
EPRE ratio of P	BCH to PBCH DMRS	dB			
EPRE ratio of P	SS to SSS	dB			
EPRE ratio of P	DSCH DMRS to SSS	dB		0	
EPRE ratio of P	DSCH to PDSCH	dB			
DMRS					
EPRE ratio of C	CNG DMRS to SSS	dB			
EPRE ratio of C	CNG to OCNG DMRS	dB			
SNR on RLM-	Config 1, 4	dB	1	-7	-15
RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
SNR on other channels and signals	Config 1, 2, 3, 4, 5, 6	dB		1	
N	Config 1, 4	dBm/		-98	
N_{oc}	Config 2, 5	15	-98		
	Config 3, 6	kHz		-98	•
N_{oc}	Config 1, 4	dBm/		-98	•
¹ Voc	Config 2, 5	SCS	-98		
	Config 3, 6			-95	

Propagation condition			TDL-C 300ns 100Hz			
Note 1:	e 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					
	,					
Note 2:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.					
Note 3:	SNR levels correspond to the signal to noise ratio over the SSS REs.					

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

Field		Test 1
		Value
gapOffse	t	0
Note 1:	and frame	PCell and PSCell are SFN-synchronous boundary aligned. (Ensure that RLM RS overlapped with measurement gap).

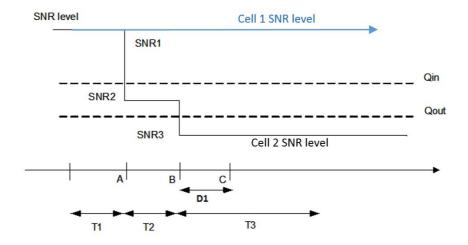


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

A.4.5.1.1.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

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

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only 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

Para	meter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3, 4, 5,		DLBWP.0.1
configuration	6		DLBWF.U.1
DL dedicated BWP	Config 1, 2, 3, 4, 5,		DLBWP.1.1
configuration	6		DEBWF.1.1
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1
configuration	6		OLDWI .O. I
UL dedicated BWP	Config 1, 2, 3, 4, 5,		ULBWP.1.1
configuration	6		
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET	Config 1, 4		CR.1.1 FDD
Reference Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1

0.1700	10 " 10 15		01470.4
SMTC Configuration Config 1, 2, 4, 5			SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
DD 4 01 1	<u> </u>		
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.4-1
Configuration	Config 3, 6		Table A.3.8.2.4-1
SSB index assigned	d as DI M DS		0
OCNG parameters	u as incivi ins		OP.1
CP length			Normal
Correlation Matrix a	and Antonno		2x2 Low
Configuration	and Antenna		ZXZ LOW
	DCI format		4.0
In sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols	005	4
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy		
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync DCI format			1-0
transmission	Number of Control		2
parameters	OFDM symbols		_
F =	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to	u D	•
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy	u D	•
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		TEO Barialo Sizo
	REG bundle size		6
DRX	TCO Buriale 3126		OFF
Gap pattern ID			N.A.
Layer 3 filtering		1	Enabled
Layer 3 lillering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking			
Hacking	Config 2, 5		TRS.1.1 TDD
T4	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2

T5		S	0.88
D1		S	0.84
Note 1:	All configurations are assigned to th T1.	e UE prio	r to the start of time period
Note 2: Note 3:	UE-specific PDCCH is not transmitte E-UTRAN is in non-DRX mode under		1 starts.

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB			4		
EPRE ratio o	f PDCCH to PDCCH DMRS	dB			0		
EPRE ratio o	f PBCH DMRS to SSS	dB					
EPRE ratio o	f PBCH to PBCH DMRS	dB					
EPRE ratio o	f PSS to SSS	dB					
EPRE ratio o	f PDSCH DMRS to SSS	dB			0		
EPRE ratio o	f PDSCH to PDSCH DMRS	dB					
EPRE ratio o	f OCNG DMRS to SSS	dB					
EPRE ratio o	f OCNG to OCNG DMRS	dB	Ī				
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
SNR on other channels and signals	Config 1, 2, 3, 4, 5, 6	dB	1				
N	Config 1, 4	dBm/			-98		
N_{oc}	Config 2, 5	15			-98		
	Config 3, 6	kHz			-98		
N_{oc}	Config 1, 4	dBm/			-98		
¹ voc	Config 2, 5	SCS			-98		
Config 3, 6			-		-95		
Propagation condition				TDL-C	300ns	100Hz	
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated							

- 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.

SNR level SNR1 SNR5 Qin SNR2 Cell 2 SNR level SNR3 Cell 2 SNR level T1 T2 T3 T4 T5

Table A.4.5.1.2.1-4: Void

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 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

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

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is o	nly 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

Active E-UTRA PCell C-UTRA RF Channel Number	Parameter		Unit	Value
E-UTRA RF Channel Number	A C F LITPA DO II			Test 1
Active PSCell				
RF Channel Number		lumber		
Duplex mode Config 1, 4 Config 2, 3, 5, 6 TDD BW _{channel} Config 1, 4 Config 2, 5 Config 3, 6 MHz 10: N _{RB,c} = 52 10: N _{RB,c} = 52 DL initial BWP configuration Config 1, 2, 3, 4, 5, 6 DLBWP.0.1 DL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 DLBWP.0.1 UL initial BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 UD dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 UD dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 DD configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 Configuration Config 1, 4 Not Applicable Config 2, 5 TDDConf.1.1 TDDConf.1.1 Config 3, 6 TDDConf.2.1 CR.1.1 FDD Config 3, 6 CR.1.1 FDD CR.1.1 FDD Config 3, 6 CR.2.1 TDD SSB.1 FR1 Config 3, 6 SSB.2 FR1 SSB.1 FR1 Sonfig 3, 6 SSB.2 FR1 SMTC.1 PDSCH/PDCH Config 1, 2, 4, 5 SMTC.1				
Config 2, 3, 5, 6 TDD		1		_
BW_channel	Duplex mode			
Config 2, 5 Config 3, 6 Config 1, 2, 3, 4, 5, 6 DLBWP.0.1				
Config 3, 6 Config 1, 2, 3, 4, 5, 6 DLBWP.0.1	BW _{channel}		MHz	
DL initial BWP configuration				
configuration Config 1, 2, 3, 4, 5, 6 DLBWP.1.1 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.0.1 UL initial BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 TDD Configuration Config 1, 4 Not Applicable TDD Configuration Config 2, 5 TDDConf.1.1 Config 3, 6 TDDConf.2.1 CORESET Reference Config 1, 4 CR.1.1 FDD Channel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 SMTC Config 3, 6 SMTC.1 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 SMTC.1 SUBCHITER Spacing Config 3, 6 SMTC.1 PRACH Configuration Config 3, 6 SMTC.1 Config 3, 6 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 Config 3, 6				40: N _{RB,c} = 106
configuration DLBWP.1.1 UL initial BWP configuration Config 1, 2, 3, 4, 5, 6 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 TDD Configuration ULBWP.1.1 TDD Configuration Config 1, 4 Not Applicable Config 2, 5 TDDConf.1.1 Config 3, 6 TDDConf.2.1 Config 1, 4 CR.1.1 FDD Connel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 Config 3, 6 SMTC.1 SMTC.1 PDSCH/PDCH Config 1, 2, 4, 5 15 kHz subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low </td <td></td> <td>Config 1, 2, 3, 4, 5, 6</td> <td></td> <td>DLBWP.0.1</td>		Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
configuration Config 1, 2, 3, 4, 5, 6 ULBWP.0.1 TDD Configuration Config 1, 4 Not Applicable Config 2, 5 TDDConf.1.1 Config 3, 6 TDDConf.2.1 CORESET Reference Config 1, 4 CR.1.1 FDD Channel Config 2, 5 CR.1.1 TDD SSB Configuration Config 3, 6 CR.2.1 TDD SSB Configuration Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 SMTC.1 Subcarrier spacing Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 OFDM symbols		Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
Configuration Config 1, 4 Not Applicable Config 2, 5 TDDConf.1.1 CORESET Reference Config 3, 6 TDDConf.2.1 Channel Config 1, 4 CR.1.1 FDD Connel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 3, 6 SMTC.1 Subcarrier spacing Config 3, 6 SOMTC.1 PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 OFDM symbols OFDM symbols		Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
TDD Configuration Config 1, 4 (Config 2, 5) Not Applicable (TDDConf.1.1) CORESET Reference Channel Config 1, 4 (CR.1.1 FDD) Channel Config 2, 5 (CR.1.1 TDD) SSB Configuration Config 3, 6 (CR.2.1 TDD) SSB Configuration Config 1, 4 (Config 2, 5 (Config 2, 6 (Config 2, 6 (Config 3, 6		Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
Config 2, 5 TDDConf.1.1 CORESET Reference Channel Config 1, 4 CR.1.1 FDD Channel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 SMTC.1 subcarrier spacing Config 3, 6 SMTC.1 PRACH Configuration Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 O OCNG parameters OP.1 Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 OFDM symbols OFDM symbols		Config 1, 4		Not Applicable
Config 3, 6 TDDConf.2.1				
CORESET Reference Channel Config 1, 4 CR.1.1 FDD Channel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 SMTC.1 subcarrier spacing Config 3, 6 SMTC.1 PRACH Configuration Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 OFDM symbols OFDM symbols				TDDConf.2.1
Channel Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 SMTC.1 subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 OFDM symbols OFDM symbols	CORESET Reference			CR.1.1 FDD
Config 3, 6 CR.2.1 TDD	Channel			CR.1.1 TDD
SSB Configuration Config 1, 4 SSB.1 FR1 Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 15 kHz subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols				CR.2.1 TDD
Config 2, 5 SSB.1 FR1 Config 3, 6 SSB.2 FR1 SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 15 kHz subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols	SSB Configuration			SSB.1 FR1
Config 3, 6 SSB.2 FR1	3			
SMTC Configuration Config 1, 2, 4, 5 SMTC.1 PDSCH/PDCCH Config 1, 2, 4, 5 15 kHz subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols				
Config 3, 6 SMTC.1	SMTC Configuration			
PDSCH/PDCCH subcarrier spacing Config 1, 2, 4, 5 15 kHz PRACH Configuration Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols	3			
subcarrier spacing Config 3, 6 30 kHz PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 Config 3, 6 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols OFDM symbols	PDSCH/PDCCH			
PRACH Configuration Config 1, 2, 4, 5 Table A.3.8.2.4-1 SSB index assigned as RLM RS 0 OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols 2				
Config 3, 6				
SSB index assigned as RLM RS OCNG parameters CP length Correlation Matrix and Antenna Configuration Out of sync transmission parameters OCNG parameters OP.1 Normal 2x2 Low 1-0 Number of Control parameters OFDM symbols	1 To torr comigaration			
OCNG parameters CP length Correlation Matrix and Antenna Configuration Out of sync transmission parameters OP.1 Normal 2x2 Low 1-0 1-0 2 OFDM symbols				
CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols				OP.1
Correlation Matrix and Antenna Configuration 2x2 Low Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols				
Out of sync DCI format 1-0 transmission Number of Control 2 parameters OFDM symbols				
transmission Number of Control 2 parameters OFDM symbols 2				
parameters OFDM symbols				
				-
, agrogation to to		Aggregation level	CCE	8

Note 2:

Note 3:

	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy	dB	4
	to average SSS RE energy		
-	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.68
T3		S	0.68
D1		S	0.64
	tions are assigned to the U		e start of time period T1.

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

UE-specific PDCCH is not transmitted after T1 starts.

E-UTRAN is in non-DRX mode under test.

Parameter		Unit		Test 1	
			T1	T2	T3
EPRE ratio	EPRE ratio of PDCCH DMRS to SSS			4	
EPRE ratio	of PDCCH to PDCCH DMRS	dB		0	
EPRE ratio	of PBCH DMRS to SSS	dB			
EPRE ratio	of PBCH to PBCH DMRS	dB			
EPRE ratio	of PSS to SSS	dB		0	
EPRE ratio	of PDSCH DMRS to SSS	dB			
EPRE ratio	of PDSCH to PDSCH DMRS	dB			
EPRE ratio	of OCNG DMRS to SSS	dB			
EPRE ratio	of OCNG to OCNG DMRS	dB			
SNR on	Config 1, 4	dB	1	-7	-15
RLM-RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
SNR on other channels and signals	Config 1, 2, 3, 4, 5, 6	dB	1		
N_{oc}	Config 1, 4	dBm/15k		-98	
¹ V _{oc}	Config 2, 5	Hz		-98	
	Config 3, 6	<u>] </u>		-98	
M	Config 1, 4	dBm/SCS		-98	
N_{oc}	Config 2, 5			-98	
	Config 3, 6	1		-95	

Propagation condition			TDL-C 300ns 100Hz		
Note 1:					
	transmitted power spectral density	y is achieved	for all OFDM symbols.		
Note 2:	The signal contains PDCCH for U	IEs other thar	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 4F	RX on all band	ds, the SNR during T3 is A.3.6.		

Table A.4.5.1.3.1-4: Void Table A.4.5.1.3.1-5: Void

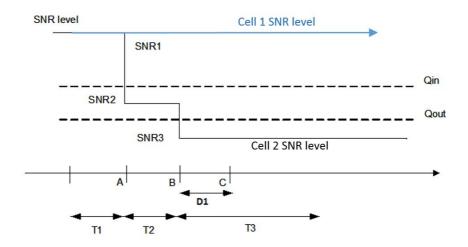


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

A.4.5.1.3.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

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

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: $N_{RB,c} = 106$
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
	Config 1, 2, 4, 5		15 kHz

PDSCH/PDCCH subcarrie spacing	er Config 3, 6		30 kHz
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.4-1
· · · · · · · · · · · · · · · · · · ·	Config 3, 6		Table A.3.8.2.4-1
SSB index assigned as RI	LM RS		0
OCNG parameters CP length			OP.1 Normal
Correlation Matrix and Ant	tenna Configuration		2x2 Low
	DCI format		1-0
	Number of Control OFDM		2
	symbols Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to average SSS RE energy		v
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
	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	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
001007	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
T1	Config 3, 6		TRS.1.2 TDD
T1 T2		S	0.2 0.2
T3		S S	0.24
T4		S	0.2
		3	
T5		S	0.88

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.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1			
			T1	T2	Т3	T4	T5
EPRE ratio o	f PDCCH DMRS to SSS	dB		•	4		
EPRE ratio o	f PDCCH to PDCCH DMRS	dB			0		
EPRE ratio o	f PBCH DMRS to SSS	dB					
EPRE ratio o	f PBCH to PBCH DMRS	dB					
EPRE ratio o	f PSS to SSS	dB			0		
EPRE ratio o	f PDSCH DMRS to SSS	dB					
EPRE ratio o	f PDSCH to PDSCH DMRS	dB					
EPRE ratio o	f OCNG DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
SNR on other channels and signals		dB	1				
N _{oc} Config 1, 4		dBm/15	-98				
Config 2, 5		kHz	-98				
Config 3, 6			-98				
N _{oc} Config 1, 4 Config 2, 5		dBm/SCS			-98		
		[-98		
	Config 3, 6		-95				
Propagation	condition		•	TDL	-C 300ns 1	00Hz	

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: Void Table A.4.5.1.4.1-5: Void

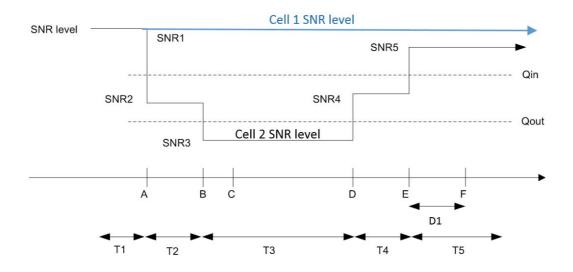


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

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

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Co	onfiguration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2

	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy		
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4	<u> </u>	CSI-RS1.1 FDD
	Config 2, 5	<u> </u>	CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		s	0.48
D1		s	0.44
	H is not transmitted after T1 start	S.	
Note 2: E-UTRAN is in non	-DRX mode under test.		

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

Pa	rameter	Unit	Test 1		
			T1	T2	Т3
PDCCH_be	eta	dB		4	
PDCCH_DI	MRS_beta	dB		4	
PBCH_beta	a	dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_be	eta	dB			
OCNG_bet	a	dB			
SNR	Config 1, 4	dB	1	-7	-15
	Config 2, 5		1	-7	-15
	Config 3, 6		1 -7 -15		
N_{oc}	Config 1, 4	dBm/15K	-98		
- · oc	Config 2, 5	Hz	-98		
	Config 3, 6			-98	

Propagat	tion condition	TDL-C 300ns 100Hz			
Note 1:		G shall be used such that the resources in Cell 2 are fully allocated and a constant			
			density is achieved for all OFDM symbols.		
Note 2:	The uplink resource	s for CSI rep	porting are assigned to the UE prior to the start of time		
	period T1.				
Note 3:	NZP CSI-RS resour	ce set config	juration for CSI reporting are assigned to the UE prior to		
	the start of time peri	od T1.			
Note 4:	Measurement gap c	onfiguration	is assigned to the UE prior to the start of time period T1.		
Note 5:	The timers and laye	ne 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 per	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 fo	or testing a UE which supports 2RX on at least one band.		
	For testing of a UE v	which suppo	rts 4RX on all bands, the SNR during T3 is [A.3.6].		

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

	Field	Test 1 Value	
	gapOffset	0	
Note 1:	Note 1: E-UTRAN PCell and PSCe synchronous and frame bo aligned.		

Table A.4.5.1.5.1-4: Void

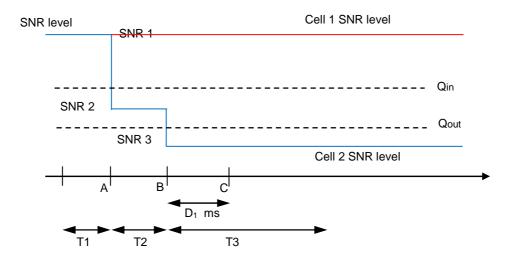


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.5.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.6.1-1, A.4.5.1.6.1-2, and A.4.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled

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

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

Paran	neter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1

	10 " :		
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configurat	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configurat	Config 1, 2, 3, 4, 5,		ULBWP.1.1
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier sp			15 KHz
	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
]	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
COI-ING IOI INLIVI	Config 3, 6		Resource #4 in TRS.1.2 TDD
OCNG parameters	Coming 5, 6		OP.1
			Normal
CP length	as Configuration		
Correlation Matrix and Antenr			2x2 Low
	DCI format		1-0
	Number of Control OFDM		2
Out of sync transmission	symbols		
parameters	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE		
	energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
	DCI format		1-0
	Number of Control OFDM		2
In sync transmission	symbols		
parameters	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE		
energy			
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			
Layer 5 internit			Enabled
		ms	Enabled 1000
T310 timer T311 timer		ms ms	

N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
Note 1: UE-specific PDCCH is not transmitted after T1 start		1 starts.	

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

	Parameter	Unit	Test 1					
			T1	T2	T3	T4	T5	
PDCCH_b	eta	dB	4					
PDCCH_D	DMRS_beta	dB			4			
PBCH_bet	ta	dB						
PSS_beta		dB						
SSS_beta		dB	0					
PDSCH_b	eta	dB	7					
OCNG_be	eta	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	
N_{oc}	Config 1, 4	dBm/15KHz	-98					
Config 2, 5			-98					
	Config 3, 6		-98					
Propagation	on condition			TD	L-C 300ns 10	0Hz		

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

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

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

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 7:

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.6.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE Note 9: which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

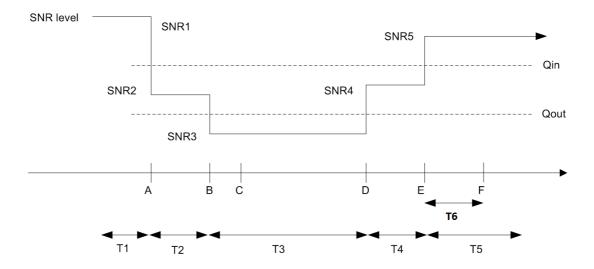


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.7.1-1, A.4.5.1.7.1-2, and A.4.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

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

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4	_	Not Applicable	
	Config 2, 5	4	TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
RMC CORESET Reference	Config 1, 4		CCR.1.1 FDD	
Channel	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6		SMTC.1	
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz	
spacing	Config 3, 6		30 KHz	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
	Config 1, 4		Resource #4 in TRS.1.1 FDD	
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD	
	Config 3, 6		Resource #4 in TRS.1.2 TDD	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Antenna	Configuration		2x2 Low	
	DCI format		1-0	

	Niveshau of Countral OFDM	1	0	
	Number of Control OFDM		2	
	symbols	005		
	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	4	
	PDCCH RE energy to			
Out of sync transmission	average CSI-RS RE			
	energy			
parameters	Ratio of hypothetical	dB	4	
	PDCCH DMRS energy to			
	average CSI-RS RE			
	energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for reporting	Config 1, 4	_	CSI-RS.1.1 FDD	
	Config 2, 5	_	CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
T1		S	0.2	
T2		S	1.28	
T3		S	1.28	
D1		S	1.24	
	not transmitted after T1 starts	S.		
Note 2: E-UTRAN is in non-DF	RX 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

F	Parameter	Unit	Test 1					
			T1	T2	T3			
PDCCH_b	oeta	dB		4				
PDCCH_I	DMRS_beta	dB		4				
PBCH_be	eta	dB						
PSS_beta	ì	dB						
SSS_beta	ì	dB	0					
PDSCH_b	oeta	dB						
OCNG_be	eta	dB						
SNR	Config 1, 4	dB	1	-7	-15			
	Config 2, 5		1 -7 -15 1 -7 -15				1 -7	-15
	Config 3, 6							
N_{oc}	Config 1, 4	dBm/15KHz	-98					
1 voc	Config 2, 5		-98					
	Config 3, 6		-98					

Propagation condition			TDL-C 300ns 100Hz	
Note 1:	OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant			
	•		ty is achieved for all OFDM symbols.	
Note 2:	The uplink resource	s for CSI reporting	g are assigned to the UE prior to the start of time	
	period T1.			
Note 3:			on for CSI reporting are assigned to the UE prior to	
	the start of time peri	od T1.		
Note 4:	Measurement gap c	onfiguration is ass	signed to the UE prior to the start of time period	
	T1.			
Note 5:	The timers and laye	r 3 filtering related	I parameters are configured prior to the start of	
	time period T1.			
Note 6:	3		other than the device under test as part of OCNG.	
Note 7:		0	o noise ratio over the SSS REs.	
Note 8:		,	Γ3 is denoted as SNR1, SNR2 and SNR3	
	respectively in figure			
Note 9:		•	ing a UE which supports 2RX on at least one	
	•	a UE which suppo	orts 4RX on all bands, the SNR during T3 is	
	[A.3.6].			

Table A.4.5.1.7.1-3A: Void

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

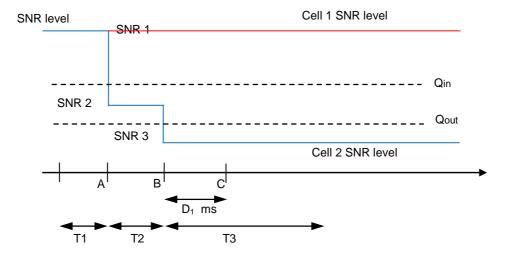


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.7.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 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.4.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to pass in one of the supported test configurations in FR1						

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

Parame	Parameter		Value
			Test 1
			0.11.4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
	Config 1, 4		CCR.1.1 FDD

PMC CORECET Patarana	Config 2, 5	l	CCR.1.1 TDD
RMC CORESET Reference Channel	Config 2, 5	-	CCR.1.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
COB Comiguration	Config 2, 5	-	SSB.1 FR1
	Config 3, 6	•	SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna	a Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		THE Statistics of the
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy	UB	0
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
DRX	REG bundle size		6 DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		me	2000
T311 timer		ms ms	1000
N310		0	1
N311			1

CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
T4		S	0.2
T5		S	1.88
T6		S	1.84
Note 1: UE-specific PD0	CCH is not transmitted after T	1 starts.	
Note 2 F-UTRAN is in r	on-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 DRX mode

	Parameter	Unit			Test 1				
			T1	T2	T3	T4	T5		
PDCCH_b	eta	dB	4						
PDCCH_E	DMRS_beta	dB			4				
PBCH_bet	ta	dB							
PSS_beta		dB							
SSS_beta		dB	0				dB 0		
PDSCH_b	eta	dB	7						
OCNG_be	eta	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		
N_{oc}	Config 1, 4	dBm/15KHz	-98						
- · oc	Config 2, 5				-98				
	Config 3, 6		-98						
Propagation	on condition			TD	L-C 300ns 10	0Hz			

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

Field		Test 1	
		Value	
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCell are SFN-		
	synchronous and frame boundary		
	aligned.	-	

Table A.4.5.1.8.1-4: Void

Table A.4.5.1.8.1-5: Void

Table A.4.5.1.8.1-6: Void

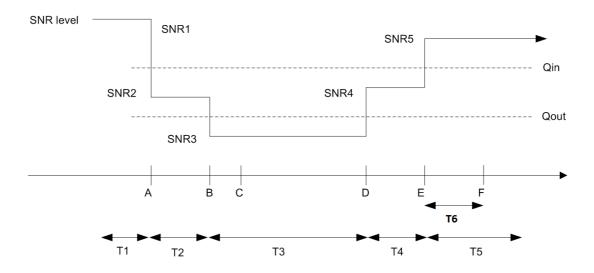


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2 Interruption

A.4.5.2.1 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS38.133 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 entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only 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 Cell2
DRX		DRX.4	DRX related parameters are defined in
		DRA.4	Table A.3.3.4-1
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	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial BWP	Config 1,4		DLBWP.0
Configuration	Config 2,5		DLBWP.0
	Config 3,6		DLBWP.0
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6	1	SR.2.1 TDD

RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
F	Config 3,6	-	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5	1	CCR.1.1 TDD
parameters	Config 3,6	1	CCR.2.1 TDD
OCNG Patterns	Gornig O,O		OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
Tree coringaration	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
COD Configuration	Config 3,6	1	SSB.2 FR1
Correlation Matrix and A	O .		1x2 Low
Configuration	THO THE		TAZ EGW
EPRE ratio of PSS to SS	SS		
EPRE ratio of PBCH DM		1	
EPRE ratio of PBCH to F		1	
EPRE ratio of PDCCH DMRS to SSS		1	
EPRE ratio of PDCCH to		-	
	EPRE ratio of PDSCH DMRS to SSS		0
EPRE ratio of PDSCH to		dB	
EPRE ratio of OCNG DM		-	
1)		_	
EPRE ratio of OCNG to OCNG DMRS			
(Note 1)			
Noc ^{Note 2}		dBm/15	
	1400		-104
SS-RSRP Note 3		dBm/15	0.7
		kHz	-87
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
ONote3		dBm/	F7.0
	Config 1,2,4,5	9.36MHz	-57.9
	Config 2.6	dBm/	E4 0
	Config 3,6	38.16MHz	-51.8
Time offset to Cell1 Note 4		μs	33
Propagation Condition		-	AWGN
Note 4 OONO als all be accept to a large			

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

Table A.4.5.2.1.1-4: Void

A.4.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.1.2-1.

Table A.4.5.2.1.2-1: Interruption length X at transition between active and non-active during DRX

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 TS 38.133 section 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.2.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.6	DRX related parameters are defined in
		DRA.0	Table A.3.3.6-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell2	
Frequency Range			FR1	
Duplex mode	Config 1,4		FDD	
	Config 2,3,5,6	1	TDD	
TDD configuration	Config 1,4		Not Applicable	
	Config 2,5		TDDConf.1.1	
	Config 3,6		TDDConf.2.1	
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	
	Config 2,5		10: N _{RB,c} = 52	
	Config 3,6		40: N _{RB,c} = 106	
Initial BWP	Config 1,4		DLBWP.0	
Configuration	Config 2,5		DLBWP.0	
	Config 3,6		DLBWP.0	
PDSCH Reference	Config 1,4		SR.1.1 FDD	
measurement channel	Config 2,5		SR.1.1 TDD	
	Config 3,6		SR.2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	
parameters	Config 2,5		CR.1.1 TDD	
	Config 3,6		CR.2.1 TDD	
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	
parameters	Config 2,5		CCR.1.1 TDD	
	Config 3,6		CCR.2.1 TDD	
OCNG Patterns			OP.1	
SMTC Configuration			SMTC.1	
TRS configuration	Config 1,4		TRS.1.1 FDD	
	Config 2,5		TRS.1.1 TDD	
	Config 3,6		TRS.1.2 TDD	
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	
	Config 3,6		SSB.2 FR1	

Correlation Matrix and Antenna		1x2 Low		
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SS	S			
EPRE ratio of PBCH to PBCH DM	RS			
EPRE ratio of PDCCH DMRS to S	SSS			
EPRE ratio of PDCCH to PDCCH	DMRS			
EPRE ratio of PDSCH DMRS to S	SS dB	0		
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SS	SS(Note			
1)				
EPRE ratio of OCNG to OCNG DI	MRS			
(Note 1)				
Noc ^{Note 2}	dBm/1	5		
	kHz	-104		
SS-RSRP Note 3	dBm/1	5 -87		
	kHz	-07		
Ê _s /I _{ot}	dB	17		
Ê _s /N _{oc}	dB	17		
Io ^{Note3}	dBm.	-57.9		
Config	9.36MI	-57.9		
Config	dBm.	-51.8		
Cornig	38.16M	Hz		
Time offset to Cell1 Note 4	μѕ	500		
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 achie	spectral density is achieved for all OFDM symbols.			
Note 2: Interference from other	cells and noise sour	ces not specified in the test is assumed to be constant over		
subcarriers and time ar	nd shall be modeled	as AWGN of appropriate power for Noc to be fulfilled.		
Note 3: SS-RSRP and lo levels	have been derived to	from other parameters for information purposes. They are		
I				

Table A.4.5.2.2.1-4: Void

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

A.4.5.2.2.2 Test Requirements

two cells

Note 4:

not settable parameters themselvess.

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

и	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 E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 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 Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.3.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.3.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OH	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6		TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5		TDDConf.1.1	TDDConf.1.1
	Config 3,6		TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1	DLBWP.0.1
	Config 3,6		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1	DLBWP.1.1
	Config 3,6		DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1	ULBWP.0.1
	Config 3,6		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1	ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1	ULBWP.1.1
	Config 3,6		ULBWP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5		SR.1.1 TDD	-
	Config 3,6		SR.2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD	CR.1.1 TDD
	Config 3,6		CR.2.1 TDD	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD	TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns			OP.1	OP.1
SMTC Configuration			SMTC.1	SMTC.1
TCI state			TCI.State.0	TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
_	Config 3,6		SSB.2 FR1	SSB.2 FR1

Correlation Matrix and	Antenna		1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to S	SSS			
EPRE ratio of PBCH D	MRS to SSS			
EPRE ratio of PBCH to	PBCH DMRS			
EPRE ratio of PDCCH	DMRS to SSS			
EPRE ratio of PDCCH	to PDCCH DMRS			
EPRE ratio of PDSCH	DMRS to SSS	dB	0	0
EPRE ratio of PDSCH	to PDSCH			
EPRE ratio of OCNG D	MRS to SSS(Note			
1)				
EPRE ratio of OCNG to	OCNG DMRS			
(Note 1)				
N _{oc} Note 2	N _{oc} Note 2		-104	-104
		kHz	-104	-104
SS-RSRP Note 3		dBm/15	-87	-87
		kHz	-01	-01
\hat{E}_s/I_{ot}		dB	17	17
Ê _s /N _{oc}		dB	17	17
Io ^{Note3}	Config 1,2,4,5	dBm/	-57.9	-57.9
	Cornig 1,2,4,5		-51.9	-57.9
	Config 3,6		-51.8	-51.8
		38.16MHz	-01.0	-51.0
Time offset to Cell1 Note 4		μs	33	33
Time offset to Cell2 Note 5		μs	-	3
Propagation Condition	Propagation Condition		AWGN	AWGN
Note 1: OCNG shall be used such that both calls are fully allocated and a constant total transmitted power				

- 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 N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

A.4.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-1 if the NR PSCell is not in the same band as the deactivated SCell or Table A.4.5.2.3.2-2 if the NR PSCell is in the same band as the deactivated SCell.

Table A.4.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length	
0	1	1	
1	0.5	1	

Table A.4.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1ms + SMTC duration subframes for intraband EN-DC, 1 subframe for synchronous interband EN-DC.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 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 Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.4.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is o	only required to be tested in one of the supported test configurations

Table A.4.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		Oll	
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	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6	=	TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5	1	TDDConf.1.1	TDDConf.1.1
	Config 3,6		TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52	10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
Initial BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1	DLBWP.0.1
	Config 3,6	1	DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5	1	DLBWP.1.1	DLBWP.1.1
	Config 3,6		DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5	1	ULBWP.0.1	ULBWP.0.1
	Config 3,6		ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1	ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1	ULBWP.1.1
	Config 3,6	1	ULBWP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5		SR.1.1 TDD	-
	Config 3,6	1	SR.2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD	CR.1.1 TDD
	Config 3,6]	CR.2.1 TDD	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD

Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD
Config 2,5	7	TRS.1.1 TDD	TRS.1.1 TDD
Config 3,6	1	TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns		OP.1	OP.1
Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
Config 3,6		SSB.2 FR1	SSB.2 FR1
		SMTC.1	SMTC.1
		TCI.State.0	TCI.State.0
ntenna		1x2 Low	1x2 Low
S			
RS to SSS			
BCH DMRS			
MRS to SSS			
PDCCH DMRS			
MRS to SSS	dB	0	0
PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note			
1)			
EPRE ratio of OCNG to OCNG DMRS			
(Note 1) Noc ^{Note 2}			
		-104	-104
			10-1
		-87	-87
		<u> </u>	17
1		17	17
Config 1,2,4,5		-57.9	-57.9
Config 3,6		-51.8	-51.8
Time offset to Cell1 Note 4		2	3
Time offset to Cell ¹ Note 5			3
Propagation Condition			
a a a al a a la 4b - 4 b -	the salle and fullis		AWGN
			otal transmitted power
	Config 2,5 Config 3,6 Config 1,2,4,5 Config 3,6 Interna SS RS to SSS PBCH DMRS MRS to SSS PDCH DMRS MRS to SSS PDCH DMRS OCNG DMRS Config 1,2,4,5 Config 3,6	Config 2,5 Config 3,6 Config 1,2,4,5 Config 3,6 Interna SS RS to SSS PBCH DMRS MRS to SSS PDCCH DMRS MRS to SSS PDCH MRS to SSS PDSCH MRS to SSS(Note OCNG DMRS dBm/15 kHz dBm/15 kHz dB dB dB dBm/ 9.36MHz Config 1,2,4,5 Config 3,6 GBm/ 9.36MHz ms µs e used such that both cells are fully	Config 2,5

- 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.

A.4.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1ms + SMTC duration subframes for synchronous intraband EN-DC, or 2 subframes for asynchronous interband EN-DC.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 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

	Config	Description		
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	equired to be tested in one of the supported test configurations		

Table A.4.5.2.5.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parame	ter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		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 DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD

TRS.1.1 FDD

Config 1,4

TRS configuration

The configuration	Coming 1,4		11(6.1.11 DD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns	- 1		OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and A	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to S	SS		
EPRE ratio of PBCH DN	MRS to SSS		
EPRE ratio of PBCH to	PBCH DMRS		
EPRE ratio of PDCCH [OMRS to SSS		
EPRE ratio of PDCCH t	o PDCCH DMRS		
EPRE ratio of PDSCH D	MRS to SSS	dB	0
EPRE ratio of PDSCH to	PDSCH		
EPRE ratio of OCNG DI	MRS to SSS(Note		
1)			
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1)			
Noc ^{Note 2}		dBm/15	-104
		kHz	-104
SS-RSRP Note 3		dBm/15	-87
		kHz	-
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Config 1,2,4,5	dBm/	-57.9
		9.36MHz	
	Config 3,6	dBm/	-51.8
	_	38.16MHz	
Time offset to Cell1 Note	4	μs	33
Propagation Condition			AWGN
			y allocated and a constant total transmitted power
•	ity is achieved for a	•	
			not specified in the test is assumed to be constant over
aubaarriara a	nd time and aball be		NIC'RL at annuanciata navvartar NL ta ha tulfillad

- subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- SS-RSRP and lo levels have been derived from other parameters for information purposes. They are Note 3: not settable parameters themselvess.
- Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and Note 4: slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

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

μ	NR Slot	Interruption length X slot	Interruption length Y slot
	length (ms)	Sync	
0	1	1	1
1	0.5	1	1

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 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, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only	te: The UE is only required to 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 two is
		1, 2	NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OH	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parame	ter	Unit	Cell2
Frequency Range	Frequency Range		FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4	_	CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD

TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5	1	TRS.1.1 TDD
	Config 3,6	1	TRS.1.2 TDD
OCNG Patterns	-		OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6	1	SSB.2 FR1
Correlation Matrix and Ar	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM	RS to SSS	1	
EPRE ratio of PBCH to P	BCH DMRS	1	
EPRE ratio of PDCCH D	MRS to SSS	1	
EPRE ratio of PDCCH to	PDCCH DMRS	1	
EPRE ratio of PDSCH DI	MRS to SSS	dB	0
EPRE ratio of PDSCH to	PDSCH		
EPRE ratio of OCNG DM	IRS to SSS(Note	1	
1)			
EPRE ratio of OCNG to 0	OCNG DMRS		
(Note 1)			
Noc ^{Note 2}		dBm/15	-104
		kHz	101
SS-RSRP Note 3		dBm/15	-87
^		kHz	
Ês/I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
IO _{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	-57.9
	Config 3,6	dBm/ 38.16MHz	-51.8
Time offset to Cell1 Note 4		μs	500
Propagation Condition			AWGN
Note 1: OCNG shall be	e used such that bo	oth cells are fully	allocated and a constant total transmitted power

- 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

A.4.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.6.2-2: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.7 Void

A.4.5.3 SCell Activation and Deactivation Delay

A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in 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.4.5.3.1.1-2 and cell-specific parameters in A.4.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in 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 $(m+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}])$, 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 CSI reporting for SCell is discontinued.

Table A.4.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is	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	slot	k	k is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by <i>dl-DataToUL-ACK</i> if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]
TCSI_Reporting	ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]
k	ms	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe}, \mu} + 1$	As specified in section 4.3 of TS 38.213 [3]

Table A. 4.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit		Cell 2	_		Cell 3	
			T1	T2	Т3	T1	T2	T3
SSB ARFCN	0 5 - 4 4			freq1			freq2	
Duplex mode	Config 1,4 Config 2,3,5,6					DD DD		
	Config 1,4					plicable		
TDD configuration	Config 2,5		TDDConf.1.1					
	Config 3,6				TDDC	onf.2.1		
	Config 1,4				10: N _R	в,с = 52		
BW _{channel}	Config 2,5	MHz			10: N _R	B,c = 52		
	Config 3,6				40: N _{RE}	s,c = 106		
DL initial BWP	Config 1, 2, 3, 4,				DLBV	VP.0.1		
configuration DL dedicated BWP	5, 6 Config 1, 2, 3, 4,							
configuration			DLBWP.1.1					
UL initial BWP	Config 1, 2, 3, 4,		ULBWP.0.1					
configuration	5, 6				ULBV	VP.U. I		
UL dedicated BWP	Config 1, 2, 3, 4,				ULBV	VP.1.1		
configuration	5, 6							
DRx Cycle		ms				plicable		
PDSCH Reference	Config 1,4			SR.1.1 FDD			SR.1.1 FDD	
measurement channel	Config 2,5		<u> </u>	SR.1.1 TDD			SR.1.1 TDD	
measurement onarmer	Config 3,6		;	SR.2.1 TDD)		SR.2.1 TDD)
RMSI CORESET	Config 1,4		(CR.1.1 FDE)		CR.1.1 FDD)
Reference Channel	Config 2,5			CR.1.1 TDE)		CR.1.1 TDD)
Reference Charmer	Config 3,6		(CR.2.1 TDD)		CR.2.1 TDD)
DMO CODECET	Config 1,4		С	CR.1.1 FD	D		CCR.1.1 FDI	D
RMC CORESET Reference Channel	Config 2,5		С	CR.1.1 TD	D		CCR.1.1 TDI	D
Reference Channel	Config 3,6		C	CR.2.1 TD	D		CCR.2.1 TDI	D
	Config 1,4		T	RS.1.1 FD	D	٦	ΓRS.1.1 FD	D
TRS configuration	Config 2,5		T	RS.1.1 TD	D	7	ΓRS.1.1 TD	D
	Config 3,6			RS.1.2 TD			ΓRS.1.2 TD	
OCNG Patterns			OP.1					
SMTC configuration			SMTC.1					
SSB configuration	Config 1,2,4,5				SSB.	1 FR1		

	Config 3,6		SSB.2 FR1
PDSCH/PDCCH	Config 1,2,4,5	kHz	15 kHz
subcarrier spacing	Config 3,6	KUZ	30kHz
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS	to SSS		
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			
EPRE ratio of PDCCH to PD		dB	0
EPRE ratio of PDSCH DMR			
EPRE ratio of PDSCH to PD			
EPRE ratio of OCNG DMRS	, ,		
EPRE ratio of OCNG to OCI	EPRE ratio of OCNG to OCNG DMRS (Note 1)		
$N_{\it oc}$ Note2	$N_{\it oc}^{}$ Note2		-104
$N_{oc}^{ m Note2}$	Config 1,2,4,5	dBm/SCS	-104
1 v oc	Config 3,6		-101
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$	$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		17
\hat{E}_s/N_{oc}		dB	17
OO DODDNote3	Config 1,2,4,5	4D xx /C C C	-87
SS-RSRP ^{Note3}	Config 3,6	dBm/SCS	-84
SCH_RP Note 3		dBm/15 kHz	-87
Propagation condition		-	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 slot (m+k), or in slot (m+1+[$T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}$]+1) as defined in section 8.3 if slot (m+k) was subject to interruption. Whether CSI report in slot (m+k) was interrupted is checked by monitoring ACK/NACK sent in PCell in slot (m+k).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, $T_{activation_time}=[T_{SMTC_SCell}+5ms]$, as defined in 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 $(m+1+[T_{HARQ}+3ms+T_{SMTC_duration}])$, 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 for 320 ms SCell measurement cycle

A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in 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.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.4.5.3.2.2 Test Requirements

The test requirements defined in section A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [$T_{SMTC_MAX} + T_{SMTC_SCell} + 5ms$].

A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in 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.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment [100ms] after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2. The UE shall be able to report valid CSI for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$ as defined in 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 $(m+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}])$ 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 CSI reporting for SCell1 is discontinued.

Table A.4.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.4.5.3.3.2 Test Requirements

The test requirements defined in section A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[2*T_{SMTC_MAX}+2*T_{SMTC_SCell}+5ms]$ as defined in section 8.3.

A.4.5.4 UE UL carrier RRC reconfiguration Delay

A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4: Void

A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in 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. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE. At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth,
	mode	FDD duplex mode;
		SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex
		mode
2	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth,
	mode	TDD duplex mode;
		SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex
		mode

3	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
4	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
5	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
6	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
7	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
8	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode				
9	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode				
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test	Value	Comment
		configuration		
RF Channel		Config 1,2,3, 4,	1, 2, 3	Three radio channels are used for
Number		5, 6, 7, 8, 9	1, 2, 3	these two tests.
Active cell		Config 1,2,3, 4,	Cell 1: E-UTRAN	E-UTRAN PCell on RF channel
		5, 6, 7, 8, 9	PCell	number 1
			Cell 2: FR1 PSCell	FR1 PSCell on RF channel number 2
			Cell 3: FR1 SCell	FR1 SCell on RF channel number 3
CP length		Config 1,2,3, 4,	Normal	
· ·		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9	OFF	
Measurement		Config 1,2,3, 4,	OFF	
gap pattern Id		5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		
T1		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

Parameter Unit	Test 1	Test 2
----------------	--------	--------

		Toot	T1	Тэ	To	T4	то	To	
		Test Configuration	11	T2	Т3	T1	T2	Т3	
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		ΓDD Conf.1	.1	-	ΓDD Conf.1.	 1	
3 3 3 3 3 3 3 3 3 3		Conf 7, 8, 9		TDD Conf.2.1		TDD Conf.2.1			
		Conf 1, 2, 3		10: N _{RB,c} = 5			10: N _{RB,c} = 52		
BW _{channel}	MHz	Conf 4, 5, 6		10: N _{RB,c} = 52		10: N _{RB,c} = 52			
		Conf 7, 8, 9		0: N _{RB,c} = 1		4	0: $N_{RB,c} = 10$	6	
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)		CR.1.1 FDD		
reference		Conf 4, 5, 6		CR.1.1 TDI	D		CR.1.1 TDD		
measurement channel as defined in A.3.1.2		Conf 7, 8, 9		CR.2.1 TDI	D		CR.2.1 TDD	1	
RMC CORESET		Conf 1, 2, 3	(CCR.1.1 FD	D	(CCR.1.1 FDI)	
reference		Conf 4, 5, 6	(CCR.1.1 TD	D	(CCR.1.1 TDI)	
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	(CCR.2.1 TDD		(CCR.2.1 TDD		
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		OP.1			OP.1		
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1		SSB.1 FR1				
		Conf 7, 8, 9	SSB.2 FR1			SSB.2 FR1			
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		SMTC.1		SMTC.1			
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		DLBWP.0.	1		DLBWP.0.1		
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		DLBWP.1.	WP.1.1 DLBWP.1.1				
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		ULBWP.1.	1	ULBWP.1.1			
EPRE ratio of PSS to SSS		0, 0, 1, 0, 0							
EPRE ratio of PBCH_DMRS to SSS									
to PBCH_DMRS									
EPRE ratio of PDCCH_DMRS to SSS									
EPRE ratio of PDCCH to PDCCH_DMRS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		0			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									
	dBm / Conf 1, 2, 3, 4, 15kHz 5, 6, 7, 8, 9		-102			-102			
N_{oc} Note 2	dBm/	Conf 1,2,3,4,5,6		-102			-102		
	SCS	Conf 7,8,9		-99			-99		
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16	
$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16	
SS-RSRP Note 3	dBm/ SCS	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86	
	303	Conf 7,8,9	-83	-83	-83	-83	-83	-83	
	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9	
Io Note 3	dBm/ 38.16 MHz	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8	
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN		
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		1 x 2			1 x 2		

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: $\hat{E}_{_{\rm s}}/I_{_{\rm ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

Parameter	Unit	Test		Test 1			Test 2		
		Configuration	T1	T2	Т3	T1	T2	Т3	
Channel number		Conf 1, 2, 3, 4,	3			3			
		5, 6, 7, 8, 9							
		Conf 1, 4, 7	N/A				N/A		
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1		
		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1		
		Conf 1, 4, 7		10: N _{RB,c} = 52			10: $N_{RB,c} = 52$		
BWchannel	MHz	Conf 2, 5, 8		10: N _{RB,c} = 52			10: N _{RB,c} = 52		
		Conf 3, 6, 9	4	40: N _{RB,c} = 1	06	40: N _{RB,c} = 106			
		Conf 1, 4, 7	G- FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	N/A	G-FR1- A3-3 in [13]	N/A	
PUSCH parameters for NR UL carrier		Conf 2, 5, 8	G- FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	N/A	G-FR1- A3-3 in [13]	N/A	
		Conf 3, 6, 9	G- FR1- A3-7 in [13]	G-FR1- A3-7 in [13]	G-FR1- A3-7 in [13]	N/A	G-FR1- A3-7 in [13]	N/A	

1	•	T.			•	•		
		Conf 1, 4, 7	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
			.2-1 in	2-1 in	-1 in [13]	IN/A	IN/A	IN/A
			[13]	[13]	-1 111[13]			
		Conf 2, 5, 8	Table	Table	Toblo			
PUCCH parameters			8.3.3.1	8.3.3.1.	Table	N1/A	N1/A	N1/A
For NR UL carrier			.2-1 in	2-1 in	8.3.3.1.2	N/A	N/A	N/A
			[13]	[13]	-1 in [13]			
		Conf 3, 6, 9	Table	Table				
		00 0, 0, 0	8.3.3.1	8.3.3.1.	Table			
			.2-2 in	2-2 in	8.3.3.1.2	N/A	N/A	N/A
			[13]	[13]	-2 in [13]			
		Conf 1, 4, 7	[10]	G-FR1-		G-FR1-	G-FR1-	G-FR1-
		COIII 1, 4, 1	N/A	A3-3 in	N/A	A3-3 in	A3-3 in	A3-3 in
			IN/A	[13]	IN/A	[13]	[13]	[13]
DUCCULnarametera		Conf 2 E 0						G-FR1-
PUSCH parameters		Conf 2, 5, 8	NI/A	G-FR1-	NI/A	G-FR1-	G-FR1-	
for supplementary			N/A	A3-3 in	N/A	A3-3 in	A3-3 in	A3-3 in
UL				[13]		[13]	[13]	[13]
		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-7 in	N/A	A3-7 in	A3-7 in	A3-7 in
				[13]		[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
DUIGOU I		Conf 2, 5, 8				T-1-1-	Table	T-1-1-
PUCCH parameters		, ,				Table	8.3.3.1.2	Table
for supplementary			N/A	N/A	N/A	8.3.3.1.2	-1 in	8.3.3.1.2
UL						-1 in [13]	[13]	-1 in [13]
		Conf 3, 6, 9				Table	Table	Table
		00111 0, 0, 0	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
			13// (14//	13//	-2 in [13]	-2 in [13]	-2 in [13]
PDSCH reference		Conf 1, 4, 7		SR.1.1 FD	D		SR.1.1 FDD	
measurement		Conf 2, 5, 8		SR.1.1 TD			SR.1.1 TDD	
channel as defined				3K.1.1 1D	ט		3K.1.1 100	<u> </u>
in A.3.1.1		Conf 3, 6, 9		SR 2.1 TD	D		SR 2.1 TDD)
RMSI CORESET		Conf 1, 4, 7		CR.1.1 FD	D		CR.1.1 FDD)
reference		Conf 2, 5, 8		CR.1.1 TD		CR.1.1 TDD		
measurement		Conf 3, 6, 9				OK.1.1 1DD		
channel as defined		00111 0, 0, 0		CR.2.1 TD	D	CR.2.1 TDD		
in A.3.1.2				011.2.1.12	_		011.2.1 122	
RMC CORESET		Conf 1, 4, 7	(CCR.1.1 FI	DD .	C	CR.1.1 FDI)
reference		Conf 2, 5, 8		CCR.1.1 TI			CR.1.1 TDI	
measurement		Conf 3, 6, 9						
channel as defined		00111 0, 0, 0	(CCR.2.1 TI	מכ		CR.2.1 TDI)
in A.3.1.3			`	JOI (1.2.1. 1.2			, o. (
OCNG Pattern Note 1		Conf 1, 2, 3		OP.1			OP.1	
		Conf 1, 2, 4, 5,						
SSB configuration		7,8		SSB.1 FR	1		SSB.1 FR1	
CCD comiguration		Conf 3, 6, 9		SSB.2 FR	1		SSB.2 FR1	
01470 (1 11		Conf 1, 2, 3, 4,						
SMTC configuration		5, 6, 7, 8, 9		SMTC.1			SMTC.1	
DL initial BWP		Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1	
configuration		5, 6, 7, 8, 9		DLDVVP.U.	. 1		DLDWP.U.T	
DL dedicated BWP		Conf 1, 2, 3, 4,		DLBWP.1.	1		DLBWP.1.1	
configuration		5, 6, 7, 8, 9		DLDWF.I.	· I		DEDWE'I'I	
UL dedicated BWP		Conf 1, 2, 3, 4,			1			<u></u>
configuration		5, 6, 7, 8, 9		ULBWP.1.	. 1		ULBWP.1.1	
EPRE ratio of PSS	۲D	Conf 1, 2, 3, 4,		^			0	
to SSS	dB	5, 6, 7, 8, 9		0			0	
	•							

EPRE ratio of	1							
PBCH_DMRS to								
SSS								
EPRE ratio of PBCH								
to PBCH_DMRS								
EPRE ratio of								
PDCCH_DMRS to								
SSS								
EPRE ratio of								
PDCCH to								
PDCCH_DMRS								
EPRE ratio of								
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
EPRE ratio of								
OCNG DMRS to								
SSS								
EPRE ratio of								
OCNG to OCNG								
DMRS								
DIVING	dBm /	Conf 1, 2, 3, 4,						
	15kHz	5, 6, 7, 8, 9		-102			-102	
$N_{oc}^{$	IJNIIZ	Conf 1, 2, 4, 5,						
1 voc	dBm/	7,8	-102 -102					
	SCS	Conf 3, 6, 9		-99		-99		
A /		Conf 1, 2, 3, 4,		-99			-99 	
\hat{E}_s/N_{oc}	dB	5, 6, 7, 8, 9	16	16	16	16	16	16
		3, 0, 1, 0, 3						
$E_{\rm s}/I_{\rm ot}$ Note 3	dB	Conf 1, 2, 3, 4,	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
.,	dBm/	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5,	16 -86	16 -86	16 -86	16 -86	16 -86	16 -86
\dot{E}_{s}/I_{ot} Note 3		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
.,	dBm/ SCS	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9						
.,	dBm/ SCS dBm/	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5,	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83
SS-RSRP Note 3	dBm/ SCS dBm/ 9.36	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86	-86	-86	-86	-86	-86
.,	dBm/ SCS dBm/ 9.36 MHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83
SS-RSRP Note 3	dBm/ SCS dBm/ 9.36 MHz dBm/	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5,	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9
SS-RSRP Note 3	dBm/ SCS dBm/ 9.36 MHz dBm/ 38.16	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83	-86 -83
SS-RSRP Note 3	dBm/ SCS dBm/ 9.36 MHz dBm/	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9
SS-RSRP Note 3 Io Note 3 Propagation	dBm/ SCS dBm/ 9.36 MHz dBm/ 38.16	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9
SS-RSRP Note 3 Io Note 3 Propagation Condition	dBm/ SCS dBm/ 9.36 MHz dBm/ 38.16	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86 -83 -57.9	-86 -83 -57.9 -51.8	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9
SS-RSRP Note 3 Io Note 3 Propagation	dBm/ SCS dBm/ 9.36 MHz dBm/ 38.16	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9 Conf 1, 2, 4, 5, 7,8 Conf 3, 6, 9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9	-86 -83 -57.9

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.4.5.5 Beam Failure Detection and Link recovery procedures

A.4.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.4.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q₀ configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q₁. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an 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.

Configuration Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 3 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 4 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 The UE is only required to pass in one of the supported test configurations in FR1 Note:

Table A.4.5.5.1.1-1: Supported test configurations for FR1 PCell

Table A.4.5.5.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value Test 1	Comment
Active E-UTRA PCell		Cell 1	
E-UTRA RF Channel Number		1	
Active PSCell		Cell 2	

RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
Dapiex mede	Config 2, 3, 5, 6	1	TDD	
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	_		·	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
_	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET Reference	Config 1, 4		CR. 1.1 FDD	
Channel	Config 2, 5		CR. 1.1 TDD	
	Config 3, 6		CR. 2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6		SMTC.1	
PDSCH/PDCCH subcarrie	er Config 1, 2, 4, 5		15 KHz	
spacing	Config 3, 6	1	30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.4-1	
	Config 3, 6		Table A.3.8.2.4-1	
SSB Index assigned as BR			0	
SSB Index assigned as CI	BD RS (q ₁)		1	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Ant	enna Configuration		2x2 Low	
	DCI format		1-0	
Beam failure detection	Number of Control OFDM symbols		2	
transmission parameters	Aggregation level	CCE	8	
and the second s	Ratio of	dB	0	
	hypothetical	u.D		
	PDCCH RE energy			
	to average CSI-RS			
	RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy			
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	1	1	OFF	

Gap pattern ID			gp0	
rlmInSyncOutOfSyncThres	shold		absent	When the field is
				absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used for
				$Q_{out_LR_SSB}$
powerControlOffsetSS			db0	Used for deriving
				rsrp-ThresholdCSI-
			n1	RS
beamFailureInstanceMax	beamFailureInstanceMaxCount			see TS 38.321 [7],
				section 5.17
beamFailureDetectionTime	er		pbfd4	see TS 38.321 [7],
				section 5.17
CSI-RS configuration for	Config 1, 4		[CSI-RS.1.1 FDD]	
CSI reporting				
	Config 2, 5		[CSI-RS.1.1 TDD]	
	Config 3, 6		[CSI-RS.2.1 TDD]	
CSI-RS for tracking	Config 1, 4		[TRS.1.1 FDD]	
	Config 2, 5		[TRS.1.1 TDD]	
	Config 3, 6		[TRS.1.2 TDD]	
SSB Index assigned as RI	_M RS		0,1	
T310 timer		ms	1000	
N310			2	
T1		s	0.2	During this time the
				the UE shall be fully
				synchronized to cell 1
T2		S	0.37	
T3		S	0.24	
T4		S	0	
T5		S	0.17	
D1		S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

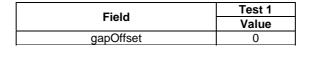
Note 2: UE-specific PDCCH is not transmitted after T1 starts. Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	IRS to SSS	dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB			0		
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DI	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_SSB of set q ₁	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6		-12	-12	5	5	5

N_{oc}		Config 1, 4	dBm/15	-98		
1 voc		Config 2, 5	KHz	-98		
		Config 3, 6		-98		
Propagat	Propagation condition			TDL-C 300ns 100Hz		
Note 1:	OCNG shall be u	used such that the	resources	in Cell 1 are fully allocated and a constant total		
	transmitted power	er spectral density	is achieve	ed for all OFDM symbols.		
Note 2:	The uplink resou	rces for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start					
	of time period T1	l.				
Note 4:	Measurement ga	ap configuration is	assigned t	to the UE prior to the start of time period T1.		
Note 5:	The timers and la	ayer 3 filtering rela	ated param	neters are configured prior to the start of time period		
	T1.					
Note 6:	The signal conta	ins PDCCH for UI	Es other th	an the device under test as part of OCNG.		
Note 7:	SNR levels corre	espond to the sign	al to noise	ratio over the SSS REs.		
Note 8:				T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in fig	gure A.4.5.5.1.1-1	•			
Note 9:				E which supports 2RX on at least one band. For		
	testing of a UE v	vhich supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in		
	section [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



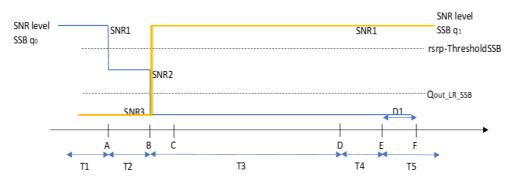


Figure A.4.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [120+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.4.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.2.1-1, A.4.5.5.2.1-2, A.4.5.5.2.1-3, A.4.5.5.2.1-4 and A.4.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	y 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		Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number	er		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	

	Config 3, 6		40: NRB,c = 106	
DI : W I DIAID C C	0 " 1 0 0 1		DI DIAID O 4	
DL initial BWP configuratio	n Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	JL initial BWP configuration Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET Reference	Config 1, 4		CR. 1.1 FDD	
Channel	Config 2, 5		CR. 1.1 TDD	
	Config 3, 6		CR. 2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	
	Config 2, 5	1	SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3, 6		SMTC.1	
PDSCH/PDCCH subcarrie	Config 1, 2, 4, 5		15 KHz	
spacing	Config 3, 6		30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.4-1	
	Config 3, 6		Table A.3.8.2.4-1	
SSB Index assigned as BF	D RS (q ₀)		0	
SSB Index assigned as CE	3D RS (q ₁)		1	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Ante	_		2x2 Low	
	DCI format		1-0	
Beam failure detection	Number of Control OFDM symbols		2	
transmission parameters	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE energy			
	to average CSI-RS			
	RE energy Ratio of	dB	0	
	hypothetical	uБ		
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
rlmInSyncOutOfSyncThres	hold		absent	When the field is
				absent, the UE
				applies the value 0.
TI 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		IE	22	(Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used for Qout_LR_SSB

				T	
powerControlOffsetSS			db0	Used for deriving	
				rsrp-ThresholdCSI-	
				RS	
beamFailureInstanceMaxCount			n1	see TS 38.321 [7],	
				section 5.17	
beamFailureDetectionTime	er		pbfd4	see TS 38.321 [7],	
			•	section 5.17	
CSI-RS configuration for	Config 1, 4		[CSI-RS.1.1 FDD]		
CSI reporting					
	Config 2, 5		[CSI-RS.1.1 TDD]		
	Config 3, 6		[CSI-RS.2.1 TDD]		
CSI-RS for tracking	Config 1, 4		[TRS.1.1 FDD]		
	Config 2, 5		[TRS.1.1 TDD]		
	Config 3, 6		[TRS.1.2 TDD]		
SSB Index assigned as RI	MRS		0,1		
T310 Timer		ms	1000		
N310			2		
T1		s	1	During this time the	
				the UE shall be fully	
				synchronized to cell 1	
T2		S	5.17		
T3		S	3.24		
T4		S	0		
T5		S	1.97		
D1		S	1.93		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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

Table A.4.5.5.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DI	MRS to SSS	dB		•	•	•	
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMI	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB			0		
EPRE ratio of PDSCH DN	/IRS to SSS	dB					
EPRE ratio of PDSCH to	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_SSB of set q ₁	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6		-12	-12	5	5	5
06-4		dBm/15	-98			_	
N_{oc}	Config 2, 5	KHz			-98		·
	Config 3, 6			•	-98	•	

Propagation condition			TDL-C 300ns 100Hz		
Note 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 repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	· ·	ration for C	SI reporting are assigned to the UE prior to the start		
	of time period T1.				
Note 4:			to the UE prior to the start of time period T1.		
Note 5:	The timers and layer 3 filtering rela	ated param	neters are configured prior to the start of time period		
	T1.				
Note 6:	The signal contains PDCCH for UI	Es other th	an the device under test as part of OCNG.		
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.					
Note 8:	The SNR in time periods T1, T2, T	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in figure A.4.5.5.1.1-1.				
Note 9:	The SNR values are specified for	testing a U	E which supports 2RX on at least one band. For		
	testing of a UE which supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in		
	section [A.3.6].		·		

Table A.4.5.5.2.1-4: Void

Table A.4.5.5.2.1-5: Void



Figure A.4.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.4.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.3.1-1, A.4.5.5.3.1-2, and A.4.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.3.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Configuration Description 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 3 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 6 LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode Note: The UE is only required to pass in one of the supported test configurations in FR1

Table A.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell	Active PCell		Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5,		TDD	
	6			
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Reference Channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	A.3.10
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC Configuration			SMTC.1	A.3.11
	5			
	Config 3, 6		SMTC.1	

PDSCH/PDCCH Config 1, 2, 4, subcarrier spacing 5			15 KHz	
	Config 3, 6		30 KHz	
	csi-RS-Index assigned as beam failure detection RS in set q ₀		0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
	Correlation Matrix and Antenna		2x2 Low	
Configuration	,			
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM		-	
parameters	symbols			
	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical	ub	U	
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	٩D	0	
	hypothetical	dB	0	
	PDCCH DMRS			
	energy to			
	average CSI-			
	RS RE energy		DEC	
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size		-	
DRX			OFF	
Gap pattern ID	size		OFF N.A.	
Gap pattern ID csi-RS-Index assigned	size as candidate		OFF	
Gap pattern ID csi-RS-Index assigned beam detection RS in	size d as candidate set q ₁		OFF N.A. 1	
Gap pattern ID csi-RS-Index assigned	size d as candidate set q ₁		OFF N.A.	When the field is
Gap pattern ID csi-RS-Index assigned beam detection RS in	size d as candidate set q ₁		OFF N.A. 1	absent, the UE
Gap pattern ID csi-RS-Index assigned beam detection RS in	size d as candidate set q ₁		OFF N.A. 1	absent, the UE applies the value 0.
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT	size d as candidate set q ₁		OFF N.A. 1 absent	absent, the UE applies the value 0. (Table 8.1.1-1).
Gap pattern ID csi-RS-Index assigned beam detection RS in	size d as candidate set q ₁	dBm	OFF N.A. 1	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB}
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI-
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent -98 db0	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7],
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent -98 db0 n1	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS	d as candidate set q ₁ Threshold	dBm	OFF N.A. 1 absent -98 db0	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7],
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection	d as candidate set q ₁ Threshold MaxCount	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration	d as candidate set q ₁ Threshold MaxCount Timer Config 1, 4	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7],
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection	size d as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration	d as candidate set q ₁ Threshold MaxCount Timer Config 1, 4	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for q ₀ and q ₁	size d as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for qo and q1 CSI-RS configuration	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.2.1 FDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for q ₀ and q ₁	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.1.1 FDD CSI-RS.1.1 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for q ₀ and q ₁ CSI-RS configuration	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for qo and q1 CSI-RS configuration for CSI reporting	AaxCount Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6 Config 1, 4	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for qo and q1 CSI-RS configuration	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for qo and q1 CSI-RS configuration for CSI reporting TRS configuration	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.2 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17 A.3.14 A.3.14
Gap pattern ID csi-RS-Index assigned beam detection RS in rlmInSyncOutOfSyncT rsrp-ThresholdSSB powerControlOffsetSS beamFailureInstanceN beamFailureDetection CSI-RS configuration for qo and q1 CSI-RS configuration for CSI reporting	I as candidate set q ₁ Threshold MaxCount Timer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5	dBm	OFF N.A. 1 absent -98 db0 n1 pbfd4 CSI-RS.1.2 FDD CSI-RS.1.2 TDD CSI-RS.2.2 TDD CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD	absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Q _{in_LR_SSB} Used for deriving rsrp-ThresholdCSI- RS see TS 38.321 [7], section 5.17 see TS 38.321 [7], section 5.17

	Config 3, 6		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.18	
T3		S	0.14	
T4		S	0	
T5		S	0.08	
D1		S	0.04	
Note 1: UE-spe	cific PDCCH is not tra	ansmitted a	fter T1 starts.	

Table A.4.5.5.3.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DI	EPRE ratio of PDCCH DMRS to SSS					•	
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB			0		
EPRE ratio of PDSCH DI	MRS to SSS	dB					
EPRE ratio of PDSCH to	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	OCNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1, 4		5	-3	-12	-12	-12
	Config 2, 5	dB	5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
	Config 1, 4		-12	-12	5	5	5
SNR_CSI-RS of set q1	Config 2, 5	dB	-12	-12	5	5	5
	Config 3, 6		-12	-12	5	5	5
N_{oc}	Config 1, 4	dBm/15			-98		
1 voc	Config 2, 5	KHz			-98		
	Config 3, 6				-98		
Propagation condition				TDL	-C 300ns 10	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

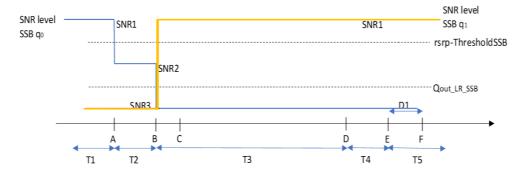


Figure A.4.5.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [30+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.4.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.4.1-1, A.4.5.5.4.1-2, A.4.5.5.4.1-3, and A.4.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.4.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
CORESET Reference	Config 1, 4		CR.1.1 FDD	A.3.1.2
Channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	A.3.10
	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	A.3.11
	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz	
subcarrier spacing	Config 3, 6		30 KHz	
csi-RS-Index assigned as I detection RS in set q ₀	peam failure		[0]	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Ante	enna Configuration		2x2 Low	
Beam failure detection	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	0	

	Ratio of	dB	0		
	hypothetical				
	PDCCH DMRS				
	energy to				
	average CSI-				
	RS RE energy				
	DMRS precoder		REG bundle size		
	granularity				
	REG bundle		6		
	size		-		
DRX	1 3 2 3		DRX.7	A.3.3.7	
Gap pattern ID			N.A.	7	
csi-RS-Index assigned	as candidate beam		1		
detection RS in set q ₁	as candidate beam		ı		
rlmInSyncOutOfSyncTh	prochold		absent	When the field is	
Illinisyncodorsyncri	iresticia		absent	absent, the UE	
				applies the value	
name Thereah aldCCD		-ID	00	0. (Table 8.1.1-1).	
rsrp-ThresholdSSB		dBm	-98	Threshold used for	
0 1 10" 100			" 0	Qin_LR_SSB	
powerControlOffsetSS			db0	Used for deriving	
				rsrp-ThresholdCSI-	
				RS	
beamFailureInstanceM	axCount		n1	see TS 38.321 [7],	
				section 5.17	
beamFailureDetectionT	imer		pbfd4	see TS 38.321 [7],	
				section 5.17	
CSI-RS configuration	Config 1, 4		CSI-RS.1.2 FDD	A.3.14	
for q ₀ and q ₁	Config 2, 5		CSI-RS.1.2 TDD		
	Config 3, 6		CSI-RS.2.2 TDD		
001.00	Config 1, 4		CSI-RS.1.1 FDD	A.3.14	
CSI-RS configuration	Config 2, 5	1	CSI-RS.1.1 TDD		
for CSI reporting	Config 3, 6		CSI-RS.2.1 TDD		
	Config 1, 4		TRS.1.1 FDD		
TRS configuration	Config 2, 5		TRS.1.1 TDD		
l itte eeimgaratien	Config 3, 6		TRS.1.2 TDD		
	Config 1, 4		CSI-RS.1.2 FDD		
csi-RS-Index	Config 2, 5	†	CSI-RS.1.2 TDD	A.3.14	
assigned as RLM RS	Config 3, 6		CSI-RS.2.2 TDD	A.J. 14	
T240 Timer	Corning 5, 6	100.0			
T310 Timer		ms	1000		
N310			2	D : 41: 41	
T1		S	1	During this time	
				the the UE shall be	
				fully synchronized	
			•	to cell 1	
T2		S S	8.37		
T3			6.44 0		
T4	T4				
T5		S	1.97		
D1		S	1.93		
Note 1: UE-specific	PDCCH is not transmitte	ed after	T1 starts.		
There is the opening in property of the state of the state.					

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5

Note 7:

Note 8:

Note 9:

EPRE ra	tio of PDCCH DM	IRS to SSS	dB						
EPRE ratio of PDCCH to PDCCH DMRS			dB						
EPRE ratio of PBCH DMRS to SSS			dB	1					
EPRE ra	tio of PBCH to PE	3CH DMRS	dB						
EPRE rat	tio of PSS to SSS	3	dB			0			
EPRE rat	tio of PDSCH DIV	IRS to SSS	dB						
EPRE rat	tio of PDSCH to F	PDSCH DMRS	dB						
EPRE rat	tio of OCNG DMF	RS to SSS	dB						
EPRE ra	tio of OCNG to O	CNG DMRS	dB						
SNR_CS	I-RS of set q₀	Config 1, 4		5	-3	-12	-12	-12	
		Config 2, 5	dB	5	-3	-12	-12	-12	
		Config 3, 6		5	-3	-12	-12	-12	
		Config 1, 4		-12	-12	5	5	5	
SNR_CS	I-RS of set q ₁	Config 2, 5	dB	-12	-12	5	5	5	
		Config 3, 6		-12 -12 5 5 5			5		
N_{oc}		Config 1, 4	dBm/15	-98					
1 oc		Config 2, 5	KHz	-98					
		Config 3, 6		-98					
Propagat	ion condition				TDL-	C 300ns 1	00Hz		
Note 1:	OCNG shall be	used such that the	e resources	in Cell 1 a	re fully alloc	cated and a	a constant t	otal	
		ver spectral density							
	Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.								
Note 3:									
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									
Note 5:	The timers and T1.	layer 3 filtering rel	ated param	eters are c	onfigured p	rior to the s	start of time	period	
Note 6:	ote 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.								

Table A.4.5.5.4.1-4: Void

The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3

The SNR values are specified for testing a UE which supports 2RX on at least one band. For

testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in

SNR levels correspond to the signal to noise ratio over the SSS REs.

respectively in figure A.4.5.5.1.1-1.

section [A.3.6].

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

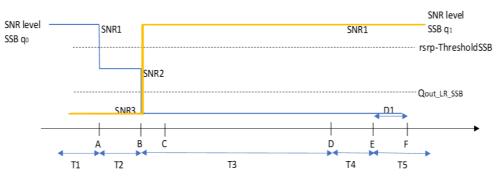


Figure A.4.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.4.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.6 Active BWP switch

A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 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 downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations.					
Note 2: A UE which fulfils to	ne 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		1	One E-UTRA radio channel is used for this
Number		I	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	<u> </u>		
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	u.D	, and the second	
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

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.1.2
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP	Config 1,4		
Configuration	Config 2,5		DLBWP.0.2 Note 4
	Config 3,6		
Active DL BWP-1	Config 1,4		
Configuration	Config 2,5		DLBWP.1.1 Note 4
	Config 3,6		
Active DL BWP-2	Config 1,4		
Configuration	Config 2,5		DLBWP.1.3 Note 4
	Config 3,6		
Initial UL BWP	Config 1,4		
Configuration	Config 2,5		ULBWP.0.2 Note 4
	Config 3,6		
Active UL BWP-1	Config 1,4		
Configuration	Config 2,5		ULBWP.1.1 Note 4
	Config 3,6		
Active UL BWP-2	Config 1,4		
Configuration	Config 2,5		ULBWP.1.3 Note 4
	Config 3,6		
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	7	SR.1.1 TDD
	Config 3,6	7	SR.2.1 TDD
	Config 1,4		CR.1.1 FDD

DMOLOG	DECET	0		CD 4.4 TDD		
RMSI CC		Config 2,5		CR.1.1 TDD		
_	parameters Config 3,6 Dedicated CORESET Config 1,4			CR.2.1 TDD		
		Config 1,4		CCR.1.1 FDD		
paramete	ers	Config 2,5		CCR.1.1 TDD		
		Config 3,6		CCR.2.1 TDD		
	OCNG Patterns			OP.1		
SSB Con	figuration	Config 1,2,4,5		SSB.1 FR1		
	Config 3,6			SSB.2 FR1		
SMTC Co	onfiguration			SMTC.1		
Correlation	on Matrix and A	ntenna		1x2 Low		
Configura	ation					
TRS Con	figuration	Config 1,4		TRS.1.1 FDD		
		Config 2,5		TRS.1.1 TDD		
		Config 3,6		TRS.1.2 TDD		
EPRE rat	tio of PSS to SS		dB	0		
EPRE rat	tio of PBCH DM	IRS to SSS				
	tio of PBCH to F					
	tio of PDCCH D					
		PDCCH DMRS				
	tio of PDSCH D					
	tio of PDSCH to					
		MRS to SSS(Note				
1)	.io oi ocivo bit	0000(11018				
,	tio of OCNG to	OCNG DMPS				
(Note 1)	io oi ocivo to	OCING DIVING				
Noc ^{Note 2}		Config 1,2,4,5	dBm/SCS	[-104]		
INOC		Config 3,6	dbiii/000	[-101]		
N _{oc} Note 2		Cornig 5,0	dBm/15kH	[-104]		
INOC				[-104]		
SS-RSRI	Note 3	Config 1 2 4 5	dBm/SCS	[-87]		
33-1311		Config 1,2,4,5 Config 3,6	ubili/303	[-90]		
Ê _s /I _{ot}	-	Corning 3,0	٩D	• •		
			dB	[17]		
Ê _s /N _{oc}			dB	[17]		
10,40162		Config 1,2,4,5	dBm/	[-59]		
		G	9.36MHz	5.04.01		
		Config 3,6	dBm/	[-61.9]		
		3 - 7 -	38.16MHz			
	ion Condition		<u> </u>	AWGN		
Note 1:	Note 1: OCNG shall be used such that both cells are fully allocated and a constant					
				ved for all OFDM symbols.		
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is					
				ne and shall be modelled as		
		ropriate power for N				
Note 3:	·					
		nformation purposes. They are not settable parameters themselves.				
Note 4:				an UL BWP. DLBWP.0.2 is		
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3					
	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].					

A.4.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

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 the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in section 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one NR PSCell (Cell 2) and one NR SCell (Cell 3) as given in Table A.4.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) and SCell (Cell 3) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in SCell.

- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	A UE which fulfil	s the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.
Note 3:	NR configuration	is the same for PSCell and SCells.

Table A.4.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		1	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	u D	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	G	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.4.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 2 Cell 3		
Frequency Range			FR1		
Duplex mode	Config 1,4		FI	DD	
	Config 2,3,5,6		TDD		
TDD configuration	Config 1,4		Not Ap	plicable	
	Config 2,5		TDDC	onf.1.1	
	Config 3,6		TDDC	onf.1.2	
BW _{channel}	Config 1,4			N _{RB,c} = 52	
	Config 2,5] [10 MHz: I	N _{RB,c} = 52	
	Config 3,6		40 MHz: N	I _{RB,c} = 106	
Active BWP ID			1, 2	0	
Initial BWP	Config 1,4		DLBWP.0.2	DLBWP.0.2	
Configuration	Config 2,5				
	Config 3,6				
Active BWP-0	Config 1,4		NA	DLBWP.0.2	
Configuration	Config 2,5				
	Config 3,6				
Active BWP-1	Config 1,4		DLBWP.1.3	NA	
Configuration	Config 2,5				
	Config 3,6				
Active BWP-2	Config 1,4		DLBWP.1.1	NA	
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.	I TDD	

Dedicated CORESET	Config 1,4		CCR.1	.1 FDD	
parameters	Config 2,5	1	CCR.1	.1 TDD	
	Config 3,6	1	CCR.2.1 TDD		
OCNG Patterns	<u> </u>		OF	P.1	
SSB Configuration	Config 1,2,4,5		SSB.	1 FR1	
	Config 3,6	1	SSB.2 FR1		
SMTC Configuration			SMTC.1		
TRS Configuration	Config 1,4		TRS.1	.1 FDD	
	Config 2,5		TRS.1	.1 TDD	
	Config 3,6		TRS.1	.2 TDD	
Antenna Configuration			1:	(2	
Propagation Condition			AW	'GN	
EPRE ratio of PSS to SS	SS	dB	0	0	
EPRE ratio of PBCH DM	IRS to SSS				
EPRE ratio of PBCH to I	PBCH DMRS				
EPRE ratio of PDCCH D	MRS to SSS				
EPRE ratio of PDCCH to	PDCCH DMRS				
EPRE ratio of PDSCH D	MRS to SSS				
EPRE ratio of PDSCH to	PDSCH				
EPRE ratio of OCNG DN					
EPRE ratio of OCNG to	OCNG DMRS Note 1				
N _{oc} Note 2		dBm/15	[-104]	[-104]	
		kHz			
SS-RSRP Note 3		dBm/15	[-87]	[-87]	
		kHz			
Ês/I _{ot}		dB	17	17	
Ê _s /N _{oc}		dB	17	17	
Io ^{Note3}	3		[-59]	[-59]	
Config 1,2,4,5		9.36MHz			
	Config 3,6		[-61.9]	[-61.9]	
	Coming 5,0	38.16MHz			
Note 1: OCNG shall b	used such that bo		/ allocated and a constant to	tal transmitted power	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(j+T_{BWPswitchDelay}+k11)$.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of SCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of k1 for type 1 and type 2 UE.

A.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in section 8.6.3. Supported test configurations are shown in Table A.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.4.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.4.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with bandwidth part configuration BWP-2, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in section 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in section 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including BWP switch command is sent till the time when RRC Reconfiguration Complete message is received.

Table A.4.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is only 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		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	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	O	
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

Parar	neter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.1.2
BW _{channel} Config 1,4			10 MHz: N _{RB,c} = 52
	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6		40 MHz: N _{RB,c} = 106
Active DL BWP ID			1, 2
Initial DL BWP Config 1,4			DLBWP.0.2
Configuration	Config 2,5		
	Config 3,6		

Active DL BWP-1	Config 1,4	1	DLBWP.1.3
Configuration			DLBWF.1.5
Comigaration	Config 3,6	-	
Active DL BWP-2	Config 1,4		DLBWP.1.1
Configuration	Config 2,5	1	DEBWF.1.1
Configuration	Config 2,5	-	
Initial UL BWP			ULBWP.0.2
Configuration	Config 1,4	-	ULBWP.U.2
Configuration	Config 2,5	-	
Active UL BWP-1	Config 3,6		LII DWD 4.2
	Config 1,4	-	ULBWP.1.3
Configuration	Config 2,5		
A C LIL DIAGO	Config 3,6		LII DIMB 4 4
Active UL BWP-2	Config 1,4	<u> </u>	ULBWP.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
	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMF			
EPRE ratio of PDCCH to P		-	
EPRE ratio of PDSCH DMF		-	
EPRE ratio of OCNG DMR		1	
EPRE ratio of OCNG to OC		1	
Noc ^{Note 2}		dBm/15	[-104]
		kHz	[]
SS-RSRP Note 3		dBm/15	[-87]
		kHz	r 1
Ê _s /I _{ot}		dB	17
Ês/Noc		dB	17
IoNote3		dBm/	[-59]
	Config 1,2,4,5	9.36MHz	[30]
	0 " 0 0	dBm/	[-61.9]
	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 Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1;
	DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of
	TS 38.213 [3].

A.4.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot ($i + T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.7 PSCell addition and release delay

A.4.5.7.1 Addition and Release Delay of known NR PSCell

A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in 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.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event A4. After receiving the Event A4, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell 2) 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.4.5.7.1.1-1: 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 TDD, NR SCS 15 kHz, BW 10 MHz, FDD		
5	LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD		
6	LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter		Unit	Value	Comment	
RF Channel Number			1 2	Two radio channels are used for this test. One	
			1, 2	for E-UTRA cell and second for NR Cell	
Initial	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	ondition Neighbour cell		Cell2	Neighbour cell on RF channel number 2.	
Final	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.	
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.	
	Threshold	dBm	-93	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in 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	juration on cell2		FR1 PRACH	Captured in A.3.8.2.1	
			configuration		
			2		
CQI/PMI periodicity and offset			[2ms]	CQI reporting for PSCell every uplink subframe	
configuration in			[21115]		
Cell-individual	offset for cells on	dB	0	Individual offset for cells on primary component	
RF channel nu	ımber 1	UD	U	carrier.	
Cell-individual	offset for cells on	dB	0	Individual offset for cells on carrier frequency of	
RF channel nu	ımber 2	UD	O	cell2.	
T1	T1		1	During this time the PCell shall be known and	
		S	ı	cell2 shall be unknown.	
T2		s	1	During this time the UE shall identify neighbour	
		3	•	cell (cell2) and report event B1.	
T3		S	0.5	During this time the UE adds the PSCell.	
T4		s	0.5	During this time the UE sends CSI reports for	
		3	0.0	PSCell.	
T5		s	0.5	During this time the UE releases the PSCell.	

Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test				
raiailletei	Onit	Coming	T1	T2	T3	T4	T5

E LITO A DE		T	
E-UTRA RF		1,2,3,4,5,6	1
Channel Number NR RF Channel			
Number		1,2,3,4,5,6	2
TDD		1,4	Not Applicable
configuration		2,5	TDDConf.1.1
garano		3,6	TDDConf.1.2
		1,4	10: N _{RB,c} = 52
BW _{channel}	MHz	2,5	10: N _{RB,c} = 52
		3,6	40: N _{RB,c} = 106
Initial BWP			DLBWP.0.1
Configuration		1,2,3	ULBWP.0.1
Dedicated BWP Configuration		1,2,3	DLBWP.1.1 ULBWP.1.1
PDSCH		1,4	SR.1.1 FDD
Reference		2,5	SR.1.1 TDD
measurement		3,6	SR.2.1 TDD
channel		3,0	5R.2.1 1DD
RMSI CORESET Reference		1,4	CR.1.1 FDD
Channel		2,5	CR.1.1 TDD
		3,6	CR.2.1 TDD
Dedicated		1,4	CCR.1.1 FDD
CORESET		2,5	CCR.1.1 TDD
Reference Channel		3,6	CCR.2.1 TDD
OCNG Patterns		1,2,3,4,5,6	OP.1
SSB		1,2,4,5	SSB.1 FR1
configuration		3,6	SSB.2 FR1
SMTC		1,2,4,5	SMTC.1
configuration		3,6	SMTC.1
TRS		1,4	TRS.1.1 FDD
Configuration		2,5	TRS.1.1 TDD
EPRE ratio of		3,6	TRS.1.2 TDD
PSS to SSS			
EPRE ratio of			
PBCH DMRS to			
SSS			
EPRE ratio of			
PBCH to PBCH			
DMRS			
EPRE ratio of			
PDCCH DMRS	dB	1,2,3,4,5,6	0
to SSS			
EPRE ratio of PDCCH to			
PDCCH DMRS			
EPRE ratio of			
PDSCH DMRS			
to SSS			
EPRE ratio of			
PDSCH to			
PDSCH			

EDDE C.	- (l			
EPRE ratio							
OCNG DM							
SSS(Note EPRE ratio	,						
OCNG to C							
DMRS (No							
	10 1)	ID (45111	100150	N1/A	0.5		
$N_{oc}^{}$ Note2		dBm/15 kHz	1,2,3,4,5,6	N/A	-85		
Note2		dBm/SCS	1,2,4,5	N/A	-85		
1 voc		ubili/303	3,6	N/A	-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 ^N	lote3	dBm/SCS	1,2,4,5	-infinity	-85		
			3,6	-infinity	-82		
Io ^{Note3}		dBm/9.36MHz	1,2,4,5	N/A -57			
		dBm/38.1MHz	3,6	N/A	-51		
Propagatio condition	n		1,2,3,4,5,6	AWGN			
Note 1:	OCNG s	shall be used suc	h that both ce	lls are full	y allocated and a constant total		
•	transmit	ted power spectra	al density is a	chieved fo	or all OFDM symbols.		
					not specified in the test is assumed to		
	be constant over subcarriers and time and shall be modelled as AWGN of appropriat						
	power fo	for N_{oc} to be fulfilled.					
Note 3:	SS-RSR	-RSRP and lo levels have been derived from other parameters for information					
	purposes. They are not settable parameters themselves.				nselves.		
					assuming independent interference		
-	and noise at each receiver antenna port.						

A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 82 ms^{Note1} into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest [20]ms into T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2msWhere:$$

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 20 ms$

 $T_{search} \quad = 0$

 $T_{\Delta}\!=20ms$

 $T_{PSCell\ DU} = 1*10+10 = 20ms$

A.4.6 Measurement procedure

A.4.6.1 Intra-frequency Measurements

A.4.6.1.1 EN-DC event triggered reporting tests without gap under non-DRX

A.4.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.1.2-1, A.4.6.1.1.2-2, A.4.6.1.1.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.1.2-1: Supported test configurations

Co	onfiguration	Description		
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	e: The UE is only required to be tested in one of the supported test configurations.			

Table A.4.6.1.1.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1	
			2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	

A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	s	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	s	1, 2, 3	5	
T2	s	1, 2, 3	5	

Table A.4.6.1.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test	Cell 2		Ce	II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	/A	N.	/A	
		2	TDDC	onf.1.1		Conf.1.1	
		3		onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2	2.1 TDD	CCR.2	.1 TDD	
OCNG Patterns		1, 2, 3	OP.1 OP.1			P.1	
TRS configuration		1	TRS.1.1 FDD N/A		/A		
		2	TRS.1	.1 TDD	N/A		
		3	TRS.1	.2 TDD	N/A		
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBV	VP.0.1	
configuration			ULBV	VP.0.1	ULBV	VP.0.1	
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBV	VP.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBV	VP.1.1	
configuration							
RLM-RS		1, 2, 3	S	SB		SB	
N_{oc} Note 2	dBm/SCS	1			-98		
OC		2			-98		
	15 (45111	3	-95				
N_{oc} Note 2	dBm/15 kHz	1	-98 -		-98		
00		2					
• /	·ID	3	4 -1.46		1020	4.40	
$\hat{\mathbf{E}}_{\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\scriptscriptstyle \mathrm{ot}}$	dB	1			-Infinity	-1.46	
5/ Ut		2					
A /	dD	3	4	4	Infinit	4	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
37 00		2					

		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16
Propagation		1, 2, 3	AWGN			
Condition						

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm acc}$ to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.2 EN-DC event triggered reporting tests without gap under DRX

A.4.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.2.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.2.1-1, A.4.6.1.2.1-2, A.4.6.1.2.1-3 and A.4.6.1.2.1-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.2.2-1: Supported test configurations

Co	nfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:						

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	Va	lue	Comment
		configur 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	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between PCell and PSCell		1, 2, 3	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.4.6.1.2.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Ce	II 3
		configuration	T1	T2	T1	T2
TDD configuration		1	N	/A	N.	/A
		2	TDDC	onf.1.1	TDDConf.1.1	
		3	TDDConf.2.1		TDDConf.2.1	
PDSCH RMC		1	SR.1.	SR.1.1 FDD		/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	

		I					
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	Ol	P.1	OF	P.1	
TRS configuration		1	TRS.1	.1 FDD	N.	/A	
_		2	TRS.1	.1 TDD	N,	/A	
		3	TRS.1	.2 TDD	N.	/A	
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBW	/P.0.1	
configuration		,, _, =,		VP.0.1	ULBW		
Active DL BWP		1, 2, 3		VP.1.1		/P.1.1	
configuration		,, _, =,					
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBW	/P.1.1	
configuration		, , -					
RLM-RS		1, 2, 3	S	SSB SSB			
Note 2	dBm/SCS	1	-98				
TV oc		2			98		
		3		-95			
Noc Note 2	dBm/15 kHz	1		-98			
TV _{oc} ·····		2					
		3	1				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
E_s/W_{oc}		2					
		3					
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16	
Propagation		1, 2, 3	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.

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.

 Configuration
 Description

 1
 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

 2
 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

 3
 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

 Note:
 The UE is only required to be tested in one of the supported test configurations.

Table A.4.6.1.3.2-1: 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	Value	Comment
		configur		
		ation		
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	ms	1, 2, 3	40	
periodicity				
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	

A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.4.6.1.3.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test	Cell 2		Се	II 3	
		configuration			T1	T2	
TDD configuration		1	N	/A	N	/A	
		2	TDDC	onf.1.1		onf.1.1	
		3	TDDC	onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N	/A	
configuration		2	SR.1.	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	OP.1 OP.1			
TRS configuration		1	TRS.1.1 FDD TRS.1.1 TDD		N	N/A	
		2			N/A		
		3	TRS.1	TRS.1.2 TDD		/A	
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBV	/P.0.1	
configuration			ULBV	VP.0.1	ULBV	/P.0.1	
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBV	/P.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.2	ULBV	/P.1.1	
configuration							
RLM-RS		1, 2, 3	CSI	-RS		SB	
N_{oc} Note 2	dBm/SCS	1			-98		
OC .		2			-98		
	15 (45111	3	-95				
$N_{oc}^{$	dBm/15 kHz	1	-		-98		
		2					
• /	-ID	3	4	4.40	1	4.40	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4 -1.46		-Infinity	-1.46	
57 01		2	_				
^ /	dB	3	4	4	Infinit	4	
\hat{E}_s/N_{oc}	an	2	4	4	-Infinity	4	
5, 60				l	1		

		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16
Propagation		1, 2, 3	AWGN			
Condition						

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.4 EN-DC event triggered reporting tests with per-UE gaps under DRX

A.4.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.4.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.4.2-1, A.4.6.1.4.2-2, A.4.6.1.4.2-3 A.4.6.1.4.2-4 and A.4.6.1.4.2-5 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.4.2-1: Supported test configurations

Configuration	Description			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.				

Table A.4.6.1.4.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test	Va	lue	Comment
		configur ation	Test 1	Test 2	
Active cell		1, 2, 3	E-UTRAN Ce Cell 2	ell 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	
Measurement gap type		1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 F	DD	
		2	CSI-RS.1.2 T	DD	
		3	CSI-RS.2.2 T	DD	
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between 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 μs		Cyriothorious delis
T2	S	1, 2, 3	5	10	+
14	5	1, 4, 3	Ü	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		Cell 2		II 3
		configuration	T1	T2	T1	T2

TDD configuration		1	N	/A	N,	/A	
3		2		onf.1.1	TDDC		
		3		onf.2.1	TDDC		
PDSCH RMC		1	SR.1.	1 FDD	N,	/A	
configuration		2	SR.1.1 TDD				
-		3	SR.2.	1 TDD			
RMSI CORESET		1		1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD		1 TDD	
configuration		3	CR.2.	1 TDD		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		.1 TDD	
OCNG Patterns		1, 2, 3		P.1	OF		
TRS configuration		1		.1 FDD	N,	/A	
J		2	_	.1 TDD	N,	/A	
		3	TRS.1	.2 TDD	N,	/A	
Initial BWP		1, 2, 3	DLBV	VP.0.1	DLBW	/P.0.1	
configuration		, ,	ULBV	ULBWP.0.1		ULBWP.0.1	
Active DL BWP		1, 2, 3	DLBWP.1.2		DLBWP.1.1		
configuration							
Active UL BWP		1, 2, 3	ULBV	ULBWP.1.2 UL		/P.1.1	
configuration							
RLM-RS		1, 2, 3	CSI	-RS		SSB	
N_{oc} Note 2	dBm/SCS	1		-(-98	
<i>oc</i>		2				-98	
		3			95		
$N_{oc}^{}$ Note 2	dBm/15 KHz	1		-98			
00		2					
• /	-ID	3		1 40	L. C. Y.	4.40	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
57 00		3					
^ /	dB	<u>3</u> 1	4	4	-Infinity	4	
\hat{E}_s/N_{oc}	uБ	2	- 4	4	-irillinity	4	
		3	_				
SS-RSRP Note 3	dBm/SCS KHz	<u>5</u> 1	-94	-94	-Infinity	-94	
55 1010	3511,000 1(12	2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	-58.50	-56.16	
Propagation		1, 2, 3			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.4.6.1.4.3 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

Ī	Configuration	Description
	1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.4.6.1.5.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

Table A.4.6.1.5.1-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2		Test Cell 2 Cell 3		
		configuration	T1	T2	T1	T2	

TDD configuration		1	N/	/A	N/	Ά	
PDSCH RMC		1	SR.1.	1 FDD	N/	Ά	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.1 FDD		
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1.	1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1	OF		OF		
TRS configuration		1	TRS.1.	1 FDD	N/	'A	
Initial BWP		1	DLBW	/P.0.1	DLBW	/P.0.1	
configuration			ULBW	/P.0.1	ULBWP.0.1		
Active DL BWP		1	DLBWP.1.1		DLBWP.1.1		
configuration							
Active UL BWP		1	ULBWP.1.1		ULBWP.1.1		
configuration							
RLM-RS		1	SSB SSB		SB		
$N_{\it oc}$ Note 2	dBm/SCS	1	-98				
N_{oc} Note 2	dBm/15 kHz	1		-98			
\hat{E}_{s}/I_{ot}	dB	1	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	1	-64.60	-62.25	-64.60	-62.25	
Propagation		1		AWGN			
Condition							
Note 1: The resor	urces for uplink transmi	ssion are assigi	ned to the UE p	orior to the	start of time	period	
T2.	·	J	·			-	
Note 2: Interferen	nce from other cells and	I noise sources	not specified ir	the test is	s assumed to	o be	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.6 EN-DC event triggered reporting tests with SSB index reading with per-UE gaps

A.4.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.6.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.6.2-1 A.4.6.1.6.2-2 and A.4.6.1.6.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.4.6.1.6.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.4.6.1.6.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur	Value	Comment
		ation		
Active cell		1	E-UTRAN Cell 1 and NR	
			Cell 2	
Neighbour cell		1	NR Cell 3	Cell to be identified.
RF Channel Number		1	1: Cell 1	
			2: Cell 2 and Cell 3	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX		1	N/A	OFF
Time offset between PCell and PSCell		1	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1	5	
T2	S	1	5	

Table A.4.6.1.6.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2		Test Cell 2 Cell 3		
		configuration	T1	T2	T1	T2	

PDSCH RMC		4					
		1	SR.1.1 FDD		N/A		
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.1 FDD		
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1.	1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1	OF		OF		
TRS configuration		1	TRS.1.	1 FDD	N/	/A	
Initial BWP		1	DLBW	/P.0.1	DLBW	/P.0.1	
configuration			ULBW	/P.0.1	ULBWP.0.1		
Active DL BWP		1	DLBW	DLBWP.1.2		DLBWP.1.1	
configuration							
Active UL BWP		1	ULBW	ULBWP.1.1 UL		ULBWP.1.1	
configuration							
RLM-RS		1	CSI	-RS	SS	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		AWGN			
Note 1: The resource	ces for uplink transmis						

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.4.6.1.6.3 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. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.1.1-1.

Table A.4.6.2.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE	The UE is only required to be tested in one of the supported test configurations					
Note 2: target N	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 Number		Config 1,2,3,4,5,6	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (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	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39	9	
SMTC-SSB parameters		Config 1,4	SSB.1 FR1	•	As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3,4,5,6	-6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
CP length		Config 1,2,3,4,5,6	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	1 1		

Table A.4.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		(Cell 3	
		configuratio	T1	T2	T1	T2	
		n					
NR RF Channel Number		Config		1		2	
		1,2,3,4,5,6					
Duplex mode		Config 1,4		F	DD		
		Config		Т	DD		
		2,3,5,6					
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52				
		Config 2,5	10: N _{RB,c} = 52				
		Config 3,6		40: N _R	B,c = 106		

BWP BW	MHz	Config 1,4		10: N _F	RB,c = 52	
		Config 2,5			RB,c = 52	
		Config 3,6			B,c = 106	
TDD configuration		Config 2,5		onf.1.1		Conf.1.1
		Config 3,6		onf.2.1	TDD	Conf.2.1
Initial DL BWP		Config	DLBV	VP.0.1		NA
Initial UL BWP		1,2,3,4,5,6	LILDY	MD 0.4		NIA
Initial OL BWP		Config 1,2,3,4,5,6	ULBV	VP.0.1		NA
Dedicated DL BWP		Config	DI BI	VP.1.1		NA
Dedicated DE DVVI		1,2,3,4,5,6	DLDV	VI .I.I		14/1
Dedicated UL BWP		Config	ULBV	VP.1.1		NA
		1,2,3,4,5,6				
TRS configuration		Config 1,4	TRS.1	.1 FDD		NA
		Config 2,5	TRS.1	.1 TDD		NA
		Config 3,6	TRS.1	.2 TDD		NA
OCNG Patterns defined in		Config				
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	0	P.1	(OP.1
PDSCH Reference		Config 1,4	SR.1.	.1 FDD		-
measurement channel		Config 2,5	SR.1.	.1 TDD	1	
		Config 3,6		1 TDD		
CORESET Reference		Config 1,4		.1 FDD		-
Channel		Config 2,5		.1 TDD	1	
		Config 3,6	CR2.	1 TDD		
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SI	MTC.5
		Config 2,3,5,6	SM	TC.1	SMTC.4	
PDSCH/PDCCH subcarrier	kHz	Config			1 =	
spacing		1,2,4,5			15	
		Config 3,6		3	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		Config				
PDCCH DMRS		1,2,3,4,5,6		0		0
EPRE ratio of PDSCH DMRS to SSS		.,_,0, .,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)						
Note2 N _{oc}	dBm/15 kHz		-98 -98		-98	
Note2	dBm/S	Config	-98 -98		-98	
1 V _{oc}	CS	1,2,4,5	-90 -98		- -	
		Config 3,6	-95			-95
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91
· · - · · ·	CS	1,2,4,5	.			•
	_	Config 3,6	-91	-91	-Infinity	-88
Ê s /I ot	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6			1	1

\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6				
Io ^{Note3}	dBm/9.	Config	-64.59	-64.59	-70.05	-62.26
	36MHz	1,2,4,5				
	dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15
	.16MHz					
Propagation Condition		Config		AV	/GN	•
		123456				

- 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 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.2 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

A.4.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.2.1-1, A.4.6.2.2.1-2, and A.4.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.2.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.2.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description			
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table A.4.6.2.2.1-2: 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			
5 LITE A DE OL		on	1	2	3	4	0 5 1 7 7 1 7 7 7		
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 (PC	Cell) and	INR	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.		
		1,2,3,4,5,6							
Measurement gap		Config	39		9				
offset		1,2,3,4,5,6	000.4						
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		
							7.6 565654 5.4456 7.167.767.		
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	ıl					
<u> </u>		1,2,3,4,5,6							
TimeToTrigger	S	Config	0						
Eller and effect and		1,2,3,4,5,6				LO filtaria nila matura ad			
Filter coefficient		Config 1,2,3,4,5,6	0			L3 filtering is not used			
DRX	ms	Config	DRX DRX DRX DRX		DRX DRX DRX DRX		DRX DRX DRX DRX		As specified in clause A.3.3
		1,2,3,4,5,6	.1	.2	.1	.2			
Time offset between		Config	3 μs	1			Synchronous EN-DC		
PCell and PSCell		1,2,3,4,5,6							

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	Зµѕ				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.1	11	1.1	11	

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Ce	II 2	(Cell 3	
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config	•			2	
		1,2,3,4,5,6					
Duplex mode		Config 1,4			FDD		
		Config		-	TDD		
200		2,3,5,6					
BW _{channel}	MHz	Config 1,4			$I_{RB,c} = 52$		
		Config 2,5			RB,c = 52		
DIA/D DIA/	B 41 1	Config 3,6			_{RB,c} = 106		
BWP BW	MHz	Config 1,4			$I_{RB,c} = 52$		
		Config 2,5		10: N	$I_{RB,c} = 52$		
TDD configuration		Config 3,6	TDDC	40: IN	RB,c = 106	Conf.1.1	
TDD configuration		Config 2,5					
		Config 3,6	TDDC	onf.2.1	TDD	Conf.2.1	
Initial DL BWP		Config	DLBW	/P.0.1	NA		
		1,2,3,4,5,6					
Initial UL BWP		Config	ULBWP.0.1			NA	
		1,2,3,4,5,6					
Dedicated DL BWP		Config	DLBWP.1.1			NA	
		1,2,3,4,5,6					
Dedicated UL BWP		Config	ULBW	/P.1.1	NA		
		1,2,3,4,5,6					
TRS configuration		Config 1,4	TRS.1.	1 FDD	NA		
-		Config 2,5	TRS.1.	1 TDD		NA	
		Config 3,6	TRS.1.	2 TDD		NA	
OCNG Patterns defined in		Config					
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	OF	P.1		OP.1	
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-	
measurement channel		Config 2,5		1 TDD	1		
		Config 3,6		TDD			
CORESET Reference		Config 1,4		1 FDD		-	
Channel		Config 2,5	CR.1.		1		
-		Config 3,6		TDD	1		
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2		SMTC.5		
		Config 2,3,5,6	SMTC.1		S	MTC.4	
PDSCH/PDCCH subcarrier	kHz	Config			15		
spacing		1,2,4,5			15		

		Config 3,6			30	
EPRE ratio of PSS to SSS		<u> </u>				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	()		0
EPRE ratio of PDSCH DMRS to SSS		1,2,0,1,0,0				
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
Note2 Noce2	dBm/15 kHz		-9	98	-98	
Note2	dBm/S CS	Config 1,2,4,5	-9	98	-98	
		Config 3,6	-9	95		-95
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
Ê s /I ot	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3,4,5,6	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.4.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

- A.4.6.2.3 Void
- A.4.6.2.4 Void
- A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Confi	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The	is only required to be tested in one of the supported test configurations					
Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2						

Table A.4.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	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 Number		Config 1,2,3,4,5,6	1, 2		Two FR1 NR carrier frequencies is used.		
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (P 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	4	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3,4,5,6	39	9			
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1		
A3-Offset	dB	Config 1,2,3,4,5,6	-6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
CP length		Config 1,2,3,4,5,6	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		3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs		Synchronous cells.		
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.1	1			

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio	T1 T2		T1	T2
		n				
NR RF Channel Number		Config	1		1 2	
		1,2,3,4,5,6				

Duplex mode		Config 1,4	F	FDD
Bapiex mode		Config		TDD .
		2,3,5,6		
BWchannel	MHz	Config 1,4	10: N	RB,c = 52
		Config 2,5	10: N	RB,c = 52
		Config 3,6		RB,c = 106
BWP BW	MHz	Config 1,4	10: N	_{RB,c} = 52
		Config 2,5		_{RB,c} = 52
		Config 3,6		RB,c = 106
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.1.1
		Config 3,6	TDDConf.2.1	TDDConf.2.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1	NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA
TRS configuration		Config 1,4	TRS.1.1 FDD	NA
110 comiguration		Config 2,5	TRS.1.1 TDD	NA NA
		Config 3,6	TRS.1.2 TDD	NA NA
OCNG Patterns defined in		Config	11(0.1.2 100	14/1
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	
		Config 3,6	CR2.1 TDD	
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.5
		Config 2,3,5,6	SMTC.1	SMTC.4
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5		15
		Config 3,6		30
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
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)				
Note2	dBm/15		-98	-98
N_{oc}	kHz			

Note2	dBm/S CS	Config 1,2,4,5	-98		-98	
		Config 3,6	-6	-95		-95
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
Ê s /I ot	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Ê s /N oc	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3,4,5,6		A	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.6 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

A.4.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.6.1-1, A.4.6.2.6.1-2, and A.4.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table

A.4.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

С	Config Description			
1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3 LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD du		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6 LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
	· · · · · · · · · · · · · · · · · · ·			
Note 2: t	2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2			

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config			1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequencies is used.
NR RF Channel		Config		1,	2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config			Cell) and	INR	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.
		1,2,3,4,5,6					
Measurement gap		Config	39		9		
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		SSB.2 FR1		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	Normal				
		1,2,3,4,5,6					

TimeToTrigger	S	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.3	13.5	1.3	13.5	

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Parameter Unit Test Cell 2		II 2	Cell 3			
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config		1	2		
		1,2,3,4,5,6					
Duplex mode		Config 1,4			FDD		
		Config 2,3,5,6			TDD		
BW _{channel}	MHz	Config 1,4		10: N	$I_{RB,c} = 52$		
		Config 2,5			$I_{RB,c} = 52$		
		Config 3,6		40: N	RB,c = 106		
BWP BW	MHz	Config 1,4		10: N	$I_{RB,c} = 52$		
		Config 2,5		10: N	I _{RB,c} = 52		
		Config 3,6		40: N	RB,c = 106		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OI	P.1	OP.1		
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-	
measurement channel		Config 2,5	SR.1.	1 TDD			
		Config 3,6	SR2.	1 TDD			
CORESET Reference		Config 1,4	CR.1.	1 FDD		-	
Channel		Config 2,5	CR.1.	1 TDD			
		Config 3,6	CR2.	1 TDD			
TDD configuration		Config 2,5		TDD	Conf.1.1		
		Config 3,6		TDDConf.2.1			
Initial DL BWP		Config		DLE	3WP.0.1		
		1,2,3,4,5,6					
TRS configuration		Config 1,4		TRS	.1.1 FDD		
		Config 2,5		TRS	.1.1 TDD		
		Config 3,6		TRS.1.2 TDD			
Initial UL BWP		Config			3WP.0.1		
		1,2,3,4,5,6					
Dedicated DL BWP		Config		DLE	BWP.1.1		
		1,2,3,4,5,6					

Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1				
SMTC configuration defined in A.3.11		Config 1,4	SM	SMTC.2		ITC.5	
		Config 2,3,5,6	SMT	ΓC.1	SM	1TC.4	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5			15		
		Config 3,6			30		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	()	0		
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
$N_{oc}^{}$ Note2	dBm/15 kHz			98		-98	
$N_{oc}^{}$ Note2	dBm/S CS	Config 1,2,4,5	-98			-98	
		Config 3,6		95		-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-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 1,2,3,4,5,6	4	4	-Infinity	7	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26	
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3,4,5,6	AWGN				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: SS-RSRP and 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 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.7 Void

A.4.6.2.8 Void

A.4.6.3 L1-RSRP measurement for beam reporting

A.4.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.4.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.3.1.1-1.

Table A.4.6.3.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Config Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

A.4.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.3.1.2-1 and Table A.4.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Charline	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
Chamer	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Chamer	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1
Initial BWF Configuration	1~0		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1
_			ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD

DRX configuration	1~6		Off
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~6	dB	0
EPRE ratio of PDSCH DMRS to	10	QD	O O
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}	1		
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~6		AWGN
Note 1. OCNG shall be used such to	hat hath call	e are fully alloca	ited and a constant

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSB#1		
Parameter Config		Offic	T1	T2	T1	T2	
$N_{oc}^{}$ Note2	1~6	dBm/15kHz	-94.65				
$N_{oc}^{ m Note2}$	1,2,4,5	dBm/SSB SCS		-94	.65		
¹♥ _{oc}	3,6	dbiii/33b 3C3		-91	.65		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~6	dB	0	0	-Infinity	3	
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65	
OOD NON	3,6	dBitty COB COC	-91.65	-91.65	-Infinity	-88.65	
lo Note3	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93	
10	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84	
\hat{E}_s/N_{oc}	1~6	dB	0	0	-Infinity	3	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the accuracy requirements as defined in Section 10.1.19.1. 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.4.6.3.2 SSB based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.4.6.3.1.

A.4.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.4.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.3.3.1-1.

Table A.4.6.3.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

A.4.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.3.3.2-1 and Table A.4.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. The DCI trigger comes in slot n (1 Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD

		•	-
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: $N_{RB,c} = 106$
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Charlie	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
Dedicated CORECET Reference	1,4		CCR.1.1 FDD
Dedicated CORESET Reference	2,5		CCR.1.1 TDD
Channel	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
	1,4		CSI-RS 1.2 FDD
CSI-RS configuration	2,5		CSI-RS 1.2 TDD
	3,6		CSI-RS 2.2 TDD
OCNG Patterns	1~6		OP.1
CONTO Factoria	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
The comigaration	3,6		TRS.1.2 TDD
	3,0		DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1
Dedicated BVVF configuration	1~0		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		Off
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
and Info	4.6		SSB#0 for resource#0
qcl-Info	1~6		SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	26
T1	1~6	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS	1		
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS	1		
Note 1			
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such tha	at hoth calls	are fully alle	ecated and a constant

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Noc Note1	1~6	dBm/15kHz	-94.65			
λ/ Note1	1,2,4,5	dBm/SSB SCS	-94	.65		
$N_{oc}^{ m Note1}$	3,6	ubiii/33b 3C3	-91.65			
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~6	dB	0	3		
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65		
Note2	3,6	dbii/33b 303	-91.65	-88.65		
lo Note2	1,2,4,5	dBm/9.36 MHz	-63.69	-61.93		
10	3,6	dBm/38.16 MHz	-57.59	-55.84		
\hat{E}_s/N_{oc}	1~6	dB	0	3		

Table A.4.6.3.3.2-2: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.3.3.3 Test Requirements

The UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in 10.1.20.1.

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.4.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.4.6.3.3.

A.4.7 Measurement Performance requirements

A.4.7.1 SS-RSRP

A.4.7.1.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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 is the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations for each supported band					

Table A.4.7.1.1.2-2: SS-RSRP Intra frequency test parameters

D		Unit	Te	est 1	Te	st 2	Tes	st 3		
Parameter		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3		
Physical cell ID			489	0	489	0	489	0		
SSB ARFCN			fr	eq1		eq1	fre	q1		
Duplex mode	Config 1,4				FD					
Bupiex mode	Config 2,3,5,6			TDD						
	Config 1,4				Not App					
TDD configuration	Config 2,5				TDDCc					
	Config 3,6				TDDCc					
	Config 1,4				10: N _{RB}					
BW _{channel}	Config 2,5	MHz			10: N _{RB}					
	Config 3,6				40: N _{RB} ,	c = 106				
Downlink initial BWP con					DLBW					
Downlink dedicated BWF					DLBW					
Uplink initial BWP config					ULBW					
Uplink dedicated BWP co	ontiguration			1	ULBW	P.1.1		1		
	Config 1,4		TRS.1. 1 FDD	NA	TRS.1.1 FDD	NA	TRS.1. 1 FDD	NA		
TRS configuration	Config 2,5		TRS.1. 1 TDD	NA	TRS.1.1 TDD	NA	TRS.1. 1 TDD	NA		
	Config 3,6		TRS.1. 2 TDD	NA	TRS.1.2 TDD	NA	TRS.1. 2 TDD	NA		
DRX Cycle		ms		Not Applicat		licable				
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-		
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD			
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD			
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-		
	Config 3,6		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD			
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD			
Control Channel RMC	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-		
	Config 3,6		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD			
SSB configuration	Config 1,4		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1		

		Config 2,5		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1
		Config 3,6		FR1 SSB.2 FR1	FR1 SSB.2 FR1	FR1 SSB.2 FR1	FR1 SSB.2 FR1	FR1 SSB.2 FR1	FR1 SSB.2 FR1
		Config 1,4	ms	-	3	-	3	-	3
Time offset	with Cell 2	Config 2,3,5,6	μs	-	3	-	3	-	3
SMTC confi	guration	Config 1,4				SMT			
	<u> </u>	Config 2,3,5,6				SMT			
OCNG Patte		Config 1,2,4,5				OP 15 k			
subcarrier s	-	Config 3,6	kHz			30k			
EPRE ratio	of PSS to SSS	<u> </u>							
	of PBCH DMRS								
	of PBCH to PB		-						
	of PDCCH DMI of PDCCH to P		dB	0	0	0	0	0	0
	of PDSCH DMF		db.	0	U	0	0		U
	of PDSCH to P								
		S to SSS(Note 1)							
EPRE ratio	of OCNG to OC	CNG DMRS (Note 1)							
		NR_FDD_FR1_A, NR_TDD_FR1_A						_1	14
		NR_FDD_FR1_B	1					-11	
		NR_TDD_FR1_C						-1	
	Config	NR_FDD_FR1_D,		-1	106	-8	38		
	1,2,4,5	NR_TDD_FR1_D NR_FDD_FR1_E,	-					-11	2.5
		NR_TDD_FR1_E,					-112		12
		NR_FDD_FR1_G	-					-111	
$N_{oc}^{}$ Note2		NR_FDD_FR1_H	dBm/15KhZ					-110.5	
1 oc		NR_FDD_FR1_A,	dbiii/ fortii2						
		NR_TDD_FR1_A NR_FDD_FR1_B						-1 -11	
		NR_TDD_FR1_C						-113	
	Config 3,6	NR_FDD_FR1_D,		Not applicable ^{Note 5}		-94			
	Coming 3,6	NR_TDD_FR1_D				-:	74	-112.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						112	
		NR_FDD_FR1_G	-					-112 -111	
		NR_FDD_FR1_H						-110.5	
	Config 1,2,4,5	5		-1	106	-88		Same as	
	001111g 1,2,1,0					`		Noc/15kHz -111	
		NR_FDD_FR1_A, NR_TDD_FR1_A						-'	11
		NR_FDD_FR1_B						-11	0.5
$N_{_{OC}}$ Note2		NR_TDD_FR1_C	dBm/SCS					-1	
1 voc	Config 3,6	NR_FDD_FR1_D,	GB11,/000	Not appl	cable ^{Note 5} -9		-91		9.5
	NR_IDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E	NIN_TOD_LINI_D						-109	
		NR_FDD_FR1_G							08
• /		NR_FDD_FR1_H					1		7.5
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
\hat{E}_s/N_{oc}			dB	6	1	6	1	3	0
		NR_FDD_FR1_A,						-111.00	-114.00
		NR_TDD_FR1_A	-					410 ===	440 ===
		NR_FDD_FR1_B NR_TDD_FR1_C	-					-110.50 -110.00	-113.50 -113.00
SS- Config	Confia	NR_FDD_FR1_D,	ID /2.2.2	400	405	60	6-	-109.50	-112.50
RSRP ^{Note3}	1,2,4,5	NR_TDD_FR1_D	dBm/SCS	-100	-105	-82	-87		
		NR_FDD_FR1_E,						-109.00	-112.00
		NR_TDD_FR1_E NR_FDD_FR1_G	-					-108.00	-111.00
		NR_FDD_FR1_H	1					-108.00	-110.50
·	1				1				

		NR_FDD_FR1_A,						-108.00	-111.00
		NR_TDD_FR1_A NR_FDD_FR1_B	-					-107.50	-110.50
		NR TDD FR1 C						-107.00	-110.00
	Config 2.6	NR_FDD_FR1_D,		- Not	Not	-85	-90	-106.50	-109.50
	Config 3,6	NR_TDD_FR1_D		applicab le ^{Note 5}	applicabl e ^{Note 5}	-65	-90		
		NR_FDD_FR1_E,		10	6			-106.00	-109.00
		NR_TDD_FR1_E							
		NR_FDD_FR1_G	_					-105.00	-108.00
		NR_FDD_FR1_H						-104.50	-107.50
		NR_FDD_FR1_A,						-80	.03
		NR_TDD_FR1_A	4	-70.09				70	50
		NR_FDD_FR1_B	_			-52.09		-79.53	
		NR_TDD_FR1_C						-79.03	
	Config	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz					-/8	.53
	1,2,4,5	NR FDD FR1 E,	9.3617172					70	02
		NR_TDD_FR1_E	-					-78.03	
		NR FDD FR1 G						-77.03	
		NR FDD FR1 H	1					-76.53	
Io ^{Note3}		NR FDD FR1 A,						-73.94	
		NR TDD FR1 A						-73	.54
		NR FDD FR1 B						-73.44	
		NR TDD FR1 C	-					-72.94	
		NR FDD FR1 D,	dBm/			-51.99		-72.44	
	Config 3,6	NR_TDD_FR1_D	38.16MHz	Not appl	icable ^{Note 5}			, , ,	
		NR FDD FR1 E,						-71	.94
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-70	.94
		NR_FDD_FR1_H	1					-70	.44
Propagatio	Propagation condition		-			AWO	3N		
Antenna co	Antenna configuration					1x:	2		
Note 1:	OCNG shall be	used such that both cel	ls are fully alloca	ited and a c	onstant total	transmitted	power sp	ectral densi	ty is
achieved for all OEDM symbols									

- 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
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS

A.4.7.1.1.3 **Test Requirements**

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in section 10.1.2.1.1 and relative requirement in section 10.1.2.1.2.

EN-DC inter-frequency measurement accuracy with FR1 serving cell and A.4.7.1.2 FR1 target cell

Test Purpose and Environment A.4.7.1.2.1

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, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is on	y required to be tested in one of the supported test configurations on each supported band

A.4.7.1.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.4.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	fig Unit Test 1 Test 2		t 2		
	Parameter Config Unit Cell 2 Ce		Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N _{RB,0}		10: N _{RB,c} = 52	
BW _{channel}	2,5	MHz	10: N _{RB,0}	c = 52	10: N _{RB,c} = 52	
	3,6		40: N _{RB,c}	= 106	40: N _{RB,0}	: = 106
Gap pattern ID			0		0	
	1,4		FDI		FD	
Duplex mode	2,5		TDI		TD	
	3,6		TDI		TD	
	1,4		N/A		N//	
TDD configuration	2,5		TDDCor		TDDCo	
	3,6		TDDCor	nf.2.1	TDDCo	nf.2.1
	1,4		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
	3,6		SR.2.1 FDD		SR.2.1 FDD	
	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET Reference	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
Ond.iiio	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-
	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Dedicated CORESET Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1,4		SSB.1		SSB.1	
SSB configuration	2,5		SSB.1		SSB.1	
	3,6		SSB.2 FR1		SSB.2	
OCNG Patterns	1~6		OP.		OP	
	1,4		TRS.1.1 FDD		TRS.1.1 FD	
TRS configuration	2,5		TRS.1.1 TDD		TRS.1.1 TD	
	3,6		TRS.1.2 TDD)	TRS.1.2 TD	D

Initial BWP Configuration		1~6		DLBWF ULBWF		DLBW ULBW	
Dedicated BWP configuration		1~6			DLBWP.1.1 ULBWP.1.1		P.1.1 P.1.1
SMTC conf	iguration	1~6		SMT	SMTC.1		C.1
Time offset and Cell 3	between Cell 2	1~6	μs	3		3	
	of PSS to SSS						
SSS EPRE ratio of	of PBCH DMRS to						
	of PBCH to PBCH						
SSS	of PDCCH DMRS to						
DMRS	of PDCCH to PDCCH	1~6	dB	0	0	0	0
SSS	of PDSCH DMRS to						
EPRE ratio of DMRS	of PDSCH to PDSCH						
EPRE ratio o	of OCNG DMRS to						
EPRE ratio of DMRS Note 1	of OCNG to OCNG						
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B						-115 -114.5
N_{oc} Note2	NR_TDD_FR1_C		dBm/15	-94.6	85	$(N_{oc} \text{ for }$	-114
IV oc	NR_FDD_FR1_D, NR_TDD_FR1_D	1~6	kHz	-34.0),	Cell 3	-113.5
	NR_FDD_FR1_E,					+8dB)	-113
	NR_TDD_FR1_E NR_FDD_FR1_G						-112
	NR_FDD_FR1_H						-111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A						-115
	NR_FDD_FR1_B					3.7	-114.5
	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5		-94.6	35	$(N_{oc} \text{ for})$	-114
	NR_TDD_FR1_D	1,2,4,5				Cell 3	-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E					+8dB)	-113
	NR_FDD_FR1_G						-112
N_{oc} Note2	NR_FDD_FR1_H		dBm/SS				-111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A,		B SCS				-112.00
	NR_SDL_FR1_A						440.50
	NR_FDD_FR1_B						-112.50 -112.00
	NR_TDD_FR1_C NR_FDD_FR1_D,	3,6		-91.6	35	(N_{oc} for	-112.00
	NR_TDD_FR1_D	-,-				C 3 +8dB)	
	NR_FDD_FR1_E, NR_TDD_FR1_E						-111.00
	NR_FDD_FR1_G					-110.00	
	NR_FDD_FR1_H				ı		-110.50
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1~6	dB	10	10	13	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A,						
SS-	NR_SDL_FR1_A	4045	dBm/SC	0.4.4	_	(RSRP for	-118.00
RSRP ^{Note3}	NR_FDD_FR1_B NR_TDD_FR1_C	1,2,4,5	S	-84.6	55	Cell 3 +25dB)	-117.50 -117.00
	NR_FDD_FR1_D,					, 2300)	
	NR_TDD_FR1_D						-116.50

		ı	1	ı		ı	1
	NR_FDD_FR1_E, NR_TDD_FR1_E						-116.00
	NR_FDD_FR1_G						-115.00
	NR_FDD_FR1_H						-114.50
	NR_FDD_FR1_A,		1				-115.00
	NR_TDD_FR1_A,						
	NR_SDL_FR1_A						11150
	NR_FDD_FR1_B						-114.50
	NR_TDD_FR1_C	2.0		04.0		(RSRP for	-114.00
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6		-81.6	5	Cell 3	-113.50
	NR_FDD_FR1_E,					+25dB)	-113.00
	NR_TDD_FR1_E						-113.00
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
	NR_FDD_FR1_A,						-85.28
	NR_TDD_FR1_A,						
	NR_SDL_FR1_A						04.70
	NR_FDD_FR1_B		,				-84.78
	NR_TDD_FR1_C		dBm/	50.00		(Io for	-84.28
	NR_FDD_FR1_D,	1,2,4,5	9.36MH -56.28				-83.78
	NR_TDD_FR1_D NR_FDD_FR1_E,	-	Z			+19.75dB)	-83.28
	NR_TDD_FR1_E						-03.20
	NR_FDD_FR1_G						-82.28
lo ^{Note3}	NR_FDD_FR1_H						-81.78
IO ₁₄₀₁₆₂	NR_FDD_FR1_A,						-79.19
	NR_TDD_FR1_A,						,,,,,
	NR_SDL_FR1_A						70.60
	NR_FDD_FR1_B						-78.69
	NR_TDD_FR1_C		dBm/		_	(Io for	-78.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6	38.16M	-50.1	9	Channel 3	-77.69
	NR_FDD_FR1_E,		Hz			+19.75dB)	-77.19
	NR_TDD_FR1_E						-//.19
	NR_FDD_FR1_G						-76.19
	NR_FDD_FR1_H						-75.69
	\hat{E}_s/N_{oc}	1~6	dB	10	10	13	-3
	gation condition	1~6	-	AWG	N	AWO	3N
	na configuration			1x2		1x	
Antenna coniguration		L	L	172		1.70	

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 Void

A.4.7.2 SS-RSRQ

A.4.7.2.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.4.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in 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	required to be tested in one of the supported test configurations in each supported band

Table A.4.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Dove		l lmi4	Te	st 1	Tes	Test 2		Test 3	
Paran	neter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1 freq1 freq1					q1	
Dunlay mada	Config 1,4				FI	DD			
Duplex mode	Config 2,3,5,6				TI	DD D			
	Config 1,4				Not Ap	plicable			
TDD configuration	Config 2,5		TDDConf.1.1						
	Config 3,6				TDDC	onf.2.1			
	Config 1,4				10: N _R	в,c = 52			
BW _{channel}	Config 2,5	MHz	MHz 10: N _{RB,c} = 52						
	Config 3,6		40: N _{RB,c} = 106						
	Initial DL BWP		DLBWP.0.1						
DIMID and Commenting	Dedicated DL BWP				DLBV	VP.1.1			
BWP configuration	Initial UL BWP	1			ULBV	VP.0.1			
	Dedicated UL BWP				ULBV	VP.1.1			
DRX Cycle		ms			Not Ap	plicable			
PDSCH Reference	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
measurement	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	_	SR.1.1 TDD	_	
channel	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	Config 2,5		CR.1.1	_	CR.1.1	-	CR.1.1	
Reference	ce Channel	-		TDD CR.2.1		TDD CR.2.1		TDD CR.2.1	
		Config 3,6		TDD CCR.1.		TDD CCR.1.		TDD CCR.1.	
		Config 1,4		1 FDD		1 FDD		1 FDD	
Control RMC	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 P	atterns					OF	2. 1		
SS-RSS	I-Measureme	ent				Not Ap	plicable		
STMC co	onfigruation						TC.1		
		Config 1,2,4,5					1 FR1		
SSB con	ifiguration	Config 3,6					2 FR1		
PDSCH/	PDCCH	Config 1,2,4,5					kHz		
	er spacing	Config 3,6	kHz				kHz		
	io of PSS to S					1	XI 12		
	io of PBCH DN		1						
	io of PBCH to								
	io of PDCCH [
		o PDCCH DMRS	dB	0	0	0	0	0	0
	io of PDSCH D								
	io of PDSCH to								
		MRS to SSS(Note 1)	1						
		OCNG DMRS (Note 1)	1						
		NR_FDD_FR1_A,			•		l .		
		NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B						-113.5	
		NR_TDD_FR1_C						-113	
	0								
	Config	NR_FDD_FR1_D,		-85		-1	01	-112.5	
	1,2,4,5	NR_TDD_FR1_D							
		NR_FDD_FR1_E,						-112	
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-111	
N_{oc}		NR_FDD_FR1_H	dBm/15k					-11	0.5
Note2		NR_FDD_FR1_A,	Hz					4	4.4
		NR_TDD_FR1_A							14
		NR_FDD_FR1_B	1						3.5
		NR_TDD_FR1_C							13
	Config	NR_FDD_FR1_D,	1						
	3,6	NR_TDD_FR1_D			91		-	-11	2.5
	3,0		-						
		NR_FDD_FR1_E,						-1	12
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-1	
		NR_FDD_FR1_H						-11	0.5
		NR_FDD_FR1_A, NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B						_11	3.5
		NR_TDD_FR1_C							13
λ7	M o c		-ID/CC					-1	13
N_{oc}	Config	NR_FDD_FR1_D,	dBm/SC	-	85	-1	01	-11	2.5
Note2	1,2,4,5	NR_TDD_FR1_D	S						
		NR_FDD_FR1_E,						-1	12
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-1	
		NR_FDD_FR1_H						-11	0.5

		NR_FDD_FR1_A,						_1	11
		NR_TDD_FR1_A NR_FDD_FR1_B							0.5
		NR_TDD_FR1_C							0.5 10
	Config	NR_FDD_FR1_D,		_,	38		_	-10	9.5
	3,6	NR_TDD_FR1_D NR_FDD_FR1_E,		,					
		NR_TDD_FR1_E						-1	09
		NR_FDD_FR1_G							08
r /I		NR_FDD_FR1_H	JD	-1.76		-4.7			7.5
$\hat{\mathbf{E}}_{\rm s}/\mathbf{I}_{\rm ot}$			dB			-4		-5.46	-5.46
\hat{E}_s/N_c	ос	_	dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A						-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
	Cantin	NR_TDD_FR1_C						-117	-117
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D		-82	-82	-103.9	-103.9	-116.5	-116.5
		NR_FDD_FR1_E,						-116	-116
		NR_TDD_FR1_E NR_FDD_FR1_G						-115	-115
SS- RSRP		NR_FDD_FR1_H	dBm/SC					-114.5	-114.5
Note3		NR_FDD_FR1_A, NR_TDD_FR1_A	S					-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
	Config 3,6	NR_TDD_FR1_C						-114	-114
		NR_FDD_FR1_D, NR_TDD_FR1_D		-85	-85	-	-	-113.5	-113.5
		NR_FDD_FR1_E,						-113	-113
		NR_TDD_FR1_E NR_FDD_FR1_G						-112	-112
		NR_FDD_FR1_H						-111.5	-111.5
		NR_FDD_FR1_A,							
		NR_TDD_FR1_A							
		NR_FDD_FR1_B NR_TDD_FR1_C							
SS-RSR	Note3	NR_FDD_FR1_D,	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
30-1010	.Q	NR_TDD_FR1_D	ub.	-14.77	-14.77	-10.70	-10.70	-17.54	-17.54
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
		NR_FDD_FR1_A, NR_TDD_FR1_A						-83	3.5
		NR_FDD_FR1_B						-8	33
		NR_TDD_FR1_C						-82	2.5
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-:	50	-7	70	-8	32
lo ^{Note3}		NR_FDD_FR1_E, NR_TDD_FR1_E						-8	1.5
		NR_FDD_FR1_G						-80).5
		NR_FDD_FR1_H	,					3-	80
	Config	NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/ 38.16M		50		-	-77	7.4
	3,6	NR_FDD_FR1_B	Hz					-76	6.9

	NR_TDD_FR1_C						-76	6.4
	NR_FDD_FR1_D,						-75	5.0
	NR_TDD_FR1_D						-73).9
	NR_FDD_FR1_E,						-75	- 1
	NR_TDD_FR1_E						-/:). 4
	NR_FDD_FR1_G						-74	1.4
	NR_FDD_FR1_H						-73	3.9
Propagation con	Propagation condition		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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. Note 6: Subtest 2 is not used when testing with 30kHz SSB SCS

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.4.7.3 SS-SINR

A.4.7.3.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.4.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.3.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in section A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

Table A.4.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	l Init	Tes	st 1	Test 2	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFO	CN			fre	eq1	free	g1		
		Config 1,4				DD	1.		
Duplex mo	oae	Config 2,3,5,6			Т	DD			
		Config 1,4			Not Ap	plicable			
TDD config	guration	Config 2,5				onf.1.1			
		Config 3,6				onf.2.1			
	nitial BWP cor					VP.0.1			
		onfiguration			DLBV	VP.1.1			
	al BWP config					VP.0.1			
	licated BWP c					VP.1.1			
DRX Cycle	e configuration		ms			plicable			
		Config 1, 4		TRS.1.1 FDD					
TRS config	guration	Config 2, 5				.1 TDD			
		Config 3, 6		CD 4.4	TRS.1	.2 TDD			
		Config 1,4		SR.1.1 FDD		SR.1.1 FDD			
	Reference nent channel	Config 2,5		SR.1.1 TDD SR.2.1	-	SR.1.1 TDD SR2.1	-		
		Config 3,6		TDD		TDD			
RMSI COF	DECET	Config 1,4		CR.1.1 FDD		CR.1.1 FDD			
Reference	_	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD			
		Config 3,6		CR.2.1		CR.2.1			
		Coming 5,0		TDD		TDD			
	0005057	Config 1,4		CCR.1. 1 FDD		CCR.1.1 FDD			
	Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1.1 TDD	-		
		Config 3,6		CCR.2. 1 TDD		CCR.2.1 TDD			
OCNG Pat	tterns	•			0	P.1			
SS-RSSI-N	Measurement				Not Ap	plicable			
SMTC con	figruation				SM	TC.1			
SSB config	nuration	Config 1,2,4,5				.1 FR1			
`		Config 3,6				2 FR1			
PDSCH/PI		Config 1,2,4,5	kHz		15				
subcarrier		Config 3,6				30	1		
	of PSS to SSS of PBCH DMRS	2 to CCC	-						
	of PBCH to PBC		-						
	of PDCCH DMF								
	of PDCCH to PI		dB	0	0	0	0		
	of PDSCH DMR		_						
	of PDSCH to PI		-						
		S to SSS(Note 1) NG DMRS (Note 1)	1						
ET IXE IAIIO	01 00110 10 00	NR_FDD_FR1_A,				[-11	[6]		
		NR_TDD_FR1_A	-			F 4 4	F <i>E</i> 1		
		NR_FDD_FR1_B	-			[-11			
		NR_TDD_FR1_C NR_FDD_FR1_D,	dDm/45kH			[-11	•		
1			dBm/15kH	[-9	90]	[-114	4.5]		
$N_{oc}^{\rm Note2}$									
$N_{\it oc}^{\rm Note2}$		NR_TDD_FR1_D	Z	_		Γ ₋ 11	141		
$N_{\it oc}$ Note2		NR_TDD_FR1_D NR_FDD_FR1_E,				[-11	[4]		
$N_{\it oc}^{ m Note2}$		NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E				_			
$N_{\it oc}$ Note2		NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G				[-11 [-11	13]		
N oc Note2	Confirmation	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H			201	[-11 [-112	13] 2.5]		
IV oc	Config 1,2,4	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H			90]	[-11	13] 2.5] Noc for		
N_{oc} Note2 N_{oc} Note2		NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H ,5		[-{		[-11 [-11] Same as 15k	13] 2.5] Noc for Hz		
IV oc	Config 1,2,4 Config 3,6	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	z	[-{	90]	[-11 [-11] Same as	13] 2.5] Noc for Hz		

		NR_TDD_FR1_C				[-11	121
		NR_FDD_FR1_D,				[-11	•
		NR_TDD_FR1_D NR_FDD_FR1_E,				[
		NR_FDD_FR1_E,				[-11	11]
		NR_FDD_FR1_G				[-11	10]
		NR_FDD_FR1_H			1	[-10	9.5]
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$			dB	[0]	[-3.19]	[-5.46]	[-5.46]
\hat{E}_s/N_{oc}			dB	[4.54]	[2.66]	[-4]	[-4]
		NR_FDD_FR1_A, NR_TDD_FR1_A				[-120]	[-120]
		NR_FDD_FR1_B				[-119.5]	[- 119.5]
		NR_TDD_FR1_C		_		[-119]	[-119]
	Config	NR_FDD_FR1_D,		[- 85.46]	[-87.34]	[-118.5]	[- 110 51
	1,2,4,5	NR_TDD_FR1_D NR_FDD_FR1_E,	- dBm/SCS -	65.40]		[-118]	118.5] [-118]
		NR_TDD_FR1_E NR_FDD_FR1_G				[-117]	[-117]
SS- RSRP ^{Not}		NR_FDD_FR1_H				[-116.5]	[- 116.5]
e3		NR_FDD_FR1_A, NR_TDD_FR1_A	abiii/SCS			[-117]	[-117]
		NR_FDD_FR1_B				[-116.5]	[- 116.5]
		NR_TDD_FR1_C				[-116]	[-116]
	Config 3,6	NR_FDD_FR1_D,		[- 82.46]	[-84.34]	[-115.5]	[-
	Coming 0,0	NR_TDD_FR1_D		82.46]	[0 1]	[445]	115.5]
		NR_FDD_FR1_E, NR_TDD_FR1_E				[-115]	[-115]
		NR_FDD_FR1_G	-			[-114]	[-114]
		NR_FDD_FR1_H				[-113.5]	[- 113.5]
		NR_FDD_FR1_A,					110.0]
		NR_TDD_FR1_A NR_FDD_FR1_B					
		NR TDD FR1 C					
SS-SINR N	ote3	NR_FDD_FR1_D,	dB	[0]	[-3.19]	[-5.46]	[5 46]
33-3INK		NR_TDD_FR1_D	иь	[0]	[-3.19]	[-5.40]	[-5.46]
		NR_FDD_FR1_E,					
		NR_TDD_FR1_E NR_FDD_FR1_G					
		NR_FDD_FR1_H					
		NR_FDD_FR1_A,				[-85	.51]
		NR_TDD_FR1_A					
		NR_FDD_FR1_B				[-85	
		NR_TDD_FR1_C	ID /			[-84	-
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	[-5	4.5]	[-84	.01]
	1,2,4,5	NR_FDD_FR1_E,	9.30101112			[-83	.51]
lo ^{Note3}		NR_TDD_FR1_E					
"		NR_FDD_FR1_G				[-82	
		NR_FDD_FR1_H				[-82	_
		NR_FDD_FR1_A, NR_TDD_FR1_A				[-79	41]
		NR_FDD_FR1_B	dBm/			[-78	.911
	Config 3,6	NR_TDD_FR1_C	38.16MHz	[-48	3.41]	[-78	
		NR_FDD_FR1_D,				[-77	
		NR_TDD_FR1_D					

	NR_FDD_FR1_E,			[-77.4	11]			
	NR_TDD_FR1_E							
	NR_FDD_FR1_G			[-76.4	¥1]			
	NR_FDD_FR1_H			[-75.9	91]			
Propagation	on condition	-		AWGN				
Antenna c	onfiguration	-	- 1x2					
Note 1:	OCNG shall be used such that both	cells are fully	allocated and a	constant total tran	nsmitted			
	power spectral density is achieved for all OFDM symbols.							
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							
Note O	for N_{oc} to be fulfilled.							
Note 3:	SS-SINR, SS-RSRP, and lo levels he purposes. They are not settable particles and the settable particles are not settable particles.			arameters for info	rmation			
Note 4:	SS-SINR, SS-RSRP minimum requirements are specified assuming independent							
	interference and noise at each receiver antenna port.							
Note 5:	NR operating band groups are as d	efined in Secti	on 3.5.2.					

A.4.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in section 10.1.12.1.1.

A.4.7.3.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.14.1.1 and 10.1.14.1.2 for interfrequency measurement.

A.4.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.3.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations

Table A.4.7.3.2.2-1: SS-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
		Oilit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Dunlay made	Config 1,4		FDD					
Duplex mode	Config 2,3,5,6		TDD					

	Config 1 4				Not An	plicable				
TDD configuration	Config 1,4 Config 2,5					onf.1.1				
TDD configuration	Config 3,6					onf.2.1				
	-									
Downlink initial BWP cor						VP.0.1				
Downlink dedicated BW			DLBWP.1.1							
Uplink initial BWP config			ULBWP.0.1							
Uplink dedicated BWP of						VP.1.1				
DRX Cycle configuration		ms				plicable				
	Config 1, 4					.1 FDD				
TRS configuration	Config 2, 5									
	Config 3, 6			ı	1	.2 TDD	ı			
	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					0	P.1				
SS-RSSI-Measurement					Not Ap	plicable				
SMTC configruation					SM	TC.1				
SSB configuration	Config 1,2,4,5				SSB.	1 FR1				
33B configuration	Config 3,6				SSB.	2 FR1				
PDSCH/PDCCH	Config 1,2,4,5	kHz				15				
subcarrier spacing	Config 3,6	KI IZ			;	30				
EPRE ratio of PSS to SSS	2 to 222									
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PB	CH DMRS	1								
EPRE ratio of PDCCH DMF	RS to SSS					_		•		
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		dB	0	0	0	0	0	0		
EPRE ratio of PDSCH to PDSCH]								
	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)									
	NR_FDD_FR1_A			201	F 4 ~	.O. E.	[-1	19.5]		
N_{oc} Note2 Config 1,2,4,5	NR_SDL_FR1_A NR_FDD_FR1_B	dBm/15k Hz] [-8	30]	[-10	8.5]	[-1	19]		
	NR_TDD_FR1_C	-						18.5]		

	1					
		NR_FDD_FR1_D				[-118]
		NR_TDD_FR1_D NR_FDD_FR1_E	-			
		NR_TDD_FR1_E				[-117.5]
		NR_FDD_FR1_G				[-116.5]
		NR_FDD_FR1_H				[-116]
	Config 1,2,4,5			[-80]	[-108.5]	Same as Noc for 15kHz
	Config 3,6	NR_FDD_FR1_A	dBm/SC S	[-77]		TOTALLE
		NR_TDD_FR1_A			[-105.5]	[-116.5]
$N_{\it oc}^{ m Note2}$		NR_SDL_FR1_A				[446]
		NR_FDD_FR1_B NR_TDD_FR1_C				[-116] [-115.5]
oc oc		NR_FDD_FR1_D				
		NR_TDD_FR1_D				[-115]
		NR_FDD_FR1_E				[-114.5]
		NR_TDD_FR1_E NR_FDD_FR1_G				[-114.5]
		NR_FDD_FR1_H				[-113]
\hat{E}_s/I_{ot}		<u></u>	dB	[-1.75]	[20]	[-4.0]
\hat{E}_{s}/N_{oc}			dB	[-1.75]	[20]	[-4.0]
s / 1 v oc		NR_FDD_FR1_A	uD	[1.70]	الحما	ا تانیا
	Config 1,2,4,5 Config 3,6	NR_TDD_FR1_A		[-81.75]	[-88.5]	[-123.5]
		NR_SDL_FR1_A				
		NR_FDD_FR1_B	dBm/SC			[-123]
		NR_TDD_FR1_C NR_FDD_FR1_D				[-122.5]
		NR_TDD_FR1_D				[-122]
		NR_FDD_FR1_E				[-121.5]
		NR_TDD_FR1_E				
SS-		NR_FDD_FR1_G NR_FDD_FR1_H				[-120.5] [-120]
RSRPNot		NR_FDD_FR1_A	S			[-120]
e3		NR_TDD_FR1_A				[-120.5]
		NR_SDL_FR1_A		[-78.75]	[-85.5]	
		NR_FDD_FR1_B NR_TDD_FR1_C				[-120]
		NR_TDD_FR1_C NR_FDD_FR1_D				[-119.5]
		NR_TDD_FR1_D				[-119]
		NR_FDD_FR1_E				[-118.5]
		NR_TDD_FR1_E				
		NR_FDD_FR1_G NR_FDD_FR1_H				[-117.5] [-117]
	1	NR_FDD_FR1_A			[20]	[-117]
		NR_TDD_FR1_A				
		NR_SDL_FR1_A				
		NR_FDD_FR1_B				
SS-S	INR Note3	NR_TDD_FR1_C NR_FDD_FR1_D	dB	[-1.75]		[-4.0]
		NR_TDD_FR1_D	ub l	[-1.75]		[1.0]
		NR_FDD_FR1_E	- - -			
		NR_TDD_FR1_E				
		NR_FDD_FR1_G NR_FDD_FR1_H				
		NR_FDD_FR1_A			[-60.5]	
	Config 1,2,4,5	NR_TDD_FR1_A	dBm/ 9.36MHz	[-49.83]		[-90.09]
Io ^{Note3}		NR_SDL_FR1_A				
		NR_FDD_FR1_B				[-89.59]
		NR_TDD_FR1_C				[-89.09]

		NR_FDD_FR1_D NR_TDD_FR1_D				[-88.59]
		NR_FDD_FR1_E				[-88.09]
		NR_TDD_FR1_E				[00:00]
		NR_FDD_FR1_G				[-87.09]
		NR_FDD_FR1_H				[-86.59]
		NR_FDD_FR1_A				
		NR_TDD_FR1_A	dBm/ 38.16MH z	[-43.73]	[-54.41]	[-84]
		NR_SDL_FR1_A				
		NR_FDD_FR1_B				[-83.5]
		NR_TDD_FR1_C				[-83]
	Config 3,6	NR_FDD_FR1_D				[00 5]
		NR_TDD_FR1_D				[-82.5]
		NR_FDD_FR1_E				100 1
		NR_TDD_FR1_E				[-82]
		NR_FDD_FR1_G				[-81]
		NR_FDD_FR1_H				[-80.5]
Propagation condition		-	AWGN			
Antenna configuration		-	1x2			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, 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.4.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in section 10.1.14.1.1 and 10.1.14.1.2.

A.4.7.4 L1-RSRP measurement for beam reporting

A.4.7.4.1 SSB based L1-RSRP measurement

A.4.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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, 10 MHz bandwidth, FDD duplex mode			
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6		LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band			

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 GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6	ĺ	TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5	İ	TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
lileasurement channel	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
Channel	3,6		CR.2.1 TDD	CR.2.1 TDD
Dadisated CODECET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Dedicated CORESET Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.3 FR1	SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1	SSB.3 FR1
·	3,6		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
·	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1	DLBWP.0.1
Initial BVVP Configuration	1~0		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~6		SMTC.1	SMTC.1
reportConfigType	1~6		periodic	periodic
reportQuantity	1~6		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~6		2	2
L1-RSRP reporting period	1~6		slot80	slot80
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS	1.6	dB	0	0
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH	1~6	ub	U	U
DMRS				
EPRE ratio of PDSCH DMRS to SSS				

EDDE rotio	o of PDSCH to PDSCH		1		
DMRS	0 01 20300 10 20300				
	o of OCNG DMRS to				
SSS ^{Note 1}					
EPRE ration DMRS Note	o of OCNG to OCNG				
Divirco	NR_FDD_FR1_A,				-117
	NR_TDD_FR1_A				-117
	NR_FDD_FR1_B				-116.5
λI	NR_TDD_FR1_C				-116
N_{oc}	NR_FDD_FR1_D,	1.6	dDm/4 Eld I=	04.65	445.5
Note2	NR_TDD_FR1_D	1~6	dBm/15kHz	-94.65	-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E NR_FDD_FR1_G				-114
	NR FDD FR1 H				-113.5
	NR_FDD_FR1_A,				-113.3
	NR_TDD_FR1_A				-117
	NR FDD FR1 B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	4045		04.05	445.5
	NR_TDD_FR1_D	1,2,4,5		-94.65	-115.5
	NR_FDD_FR1_E,				445
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G		ID (00D		-114
N_{oc}	NR_FDD_FR1_H		dBm/SSB		-113.5
Note2	NR_FDD_FR1_A,		SCS		-114
	NR_TDD_FR1_A				-114
	NR_FDD_FR1_B		3,6		-113.5
	NR_TDD_FR1_C	3,6			-114
	NR_FDD_FR1_D,			04.05	440.5
	NR_TDD_FR1_D			-91.65	-112.5
	NR_FDD_FR1_E,				-112
	NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
\hat{E}_{s}/I_{ot}		1~6	dB	10	-3
57 01	NR_FDD_FR1_A,				400
	NR_TDD_FR1_A				-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,	1015		-84.65	-118.5
	NR_TDD_FR1_D	1,2,4,5		-84.00	-116.5
	NR_FDD_FR1_E,				110
	NR_TDD_FR1_E				-118
CCD	NR_FDD_FR1_G	1			-117
SSB RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A,		SCS		-117
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3,6		-81.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				111
	NR_FDD_FR1_G	1			-114
	NR_FDD_FR1_H	<u> </u>			-113.5

	NR_FDD_FR1_A, NR_TDD_FR1_A				-87.28
	NR_FDD_FR1_B			-86.78	
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D,	1,2,4,5	dBm/9.36	-56.28	-85.78
	NR_TDD_FR1_D	1,2,4,5	MHz	-30.20	-03.70
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
10	NR_FDD_FR1_A,				-81.19
	NR_TDD_FR1_A				-01.13
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C				-80.19
	NR_FDD_FR1_D,	3,6	dBm/38.16	-50.19	-79.69
	NR_TDD_FR1_D	0,0	MHz	50.15	7 5.05
	NR_FDD_FR1_E,				-79.19
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}		1~6	dB	10	-3
Propagation condition		1~6		AWGN	AWGN
Antenna	configuration	1~6		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power
 - for N_{oc} to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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.

A.4.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.4.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations in each supported band

A.4.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.4.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measurement channel	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
Channel	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Neierence Channel	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.1 FR1	SSB.1 FR1
SSB configuration	2,5		SSB.1 FR1	SSB.1 FR1
	3,6		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1	DLBWP.0.1
_			ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1

				ULBWP.1.1	ULBWP.1.1
SMTC configuration		1~6		SMTC.1	SMTC.1
C O comigaration		1,4		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS		2,5		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
001110		3,6		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportCo	ofiaTypo	1~6		periodic	periodic
reportQu		1~6		cri-RSRP	cri-RSRP
	of reported RS	1~6		2	2
	reporting period	1~6		slot80	slot80
	of PSS to SSS	1~0		510100	510100
	of PBCH DMRS to SSS				
	of PBCH to PBCH DMRS				
EPRE ratio	of PDCCH DMRS to SSS				
	of PDCCH to PDCCH				
DMRS	at DDCCLLDMDC to CCC	1~6	dB	0	0
	of PDSCH DMRS to SSS of PDSCH to PDSCH	1~6	uБ	U	0
DMRS	001 FD3CH (0 FD3CH				
	of OCNG DMRS to				
SSS ^{Note 1}					
	of OCNG to OCNG				
DMRS Note					
	NR_FDD_FR1_A,				-117
	NR_TDD_FR1_A				440.5
	NR_FDD_FR1_B	 	dBm/15kHz	-94.65	-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~6			-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				444
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				-117
	NR_TDD_FR1_A				110 5
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2,4,5		-94.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				444
M	NR_FDD_FR1_G NR_FDD_FR1_H		dBm/CSI-RS		-114 -113.5
N_{oc}					-113.3
Note2	NR_FDD_FR1_A, NR_TDD_FR1_A		SCS		-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				
	NR_FDD_FR1_D,				-114
	NR_TDD_FR1_D	3,6		-91.65	-112.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E,				-112
	NR_FDD_FR1_G				-111
△ /_	NR_FDD_FR1_H				-110.5
\hat{E}_{s}/I_{ot}	ND EDD ED4 A	1~6	dB	10	10
CSI-RS	NR_FDD_FR1_A,		4D/COL DC		-120
RSRP	NR_TDD_FR1_A	1,2,4,5	dBm/CSI-RS	-84.65	110 5
Note3	NR_FDD_FR1_B		SCS		-119.5
	NR_TDD_FR1_C				-119

	NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5
	NR_FDD_FR1_E,	<u> </u>			
	NR_TDD_FR1_E				-118
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A,				-117
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3,6		-81.65	-115.5
	NR_TDD_FR1_D	0,0		01.00	110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E	<u> </u>			
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				-87.28
	NR_TDD_FR1_A	ļ			
	NR_FDD_FR1_B	1			-86.78
	NR_TDD_FR1_C			-86.28	
	NR_FDD_FR1_D,	D 1,2,4,5	dBm/9.36 MHz	-56.28	-85.78
	NR_TDD_FR1_D				
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_G	1			-84.28
	NR_FDD_FR1_H	1			-83.78
lo Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-81.19
	NR_FDD_FR1_B	†			-80.69
	NR_TDD_FR1_C	 			-80.19
	NR_FDD_FR1_D,	 	dBm/38.16		
	NR_TDD_FR1_D	3,6	MHz	-50.19	-79.69
	NR_FDD_FR1_E,				-0.40
	NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G	†			-78.19
	NR_FDD_FR1_H	†			-77.69
\hat{E}_s/N_{oc}		1~6	dB	10	-3
	Propagation condition			AWGN	AWGN
	configuration	1~6 1~6		1x2	1x2
/ interina configuration				17.2	1702

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.4.7.4.2.3 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.

A.4.7.5 SFTD accuracy

A.4.7.5.1 SFTD accuracy

A.4.7.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in section 9.1.27 in TS 36.133 [15] for EN-DC SFTD measurements.

A.4.7.5.1.2 Test Parameters

Supported test configurations are shown in Table A.4.7.5.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is NR FR1 PSCell. The test parameters of cell 1 are given in section A.3.7.2.1. The test parameters of cell 2 are given in Table A.4.7.5.1.2-2. The SFTD between PCell and PSCell shall be set by the test equipment to one of the time differences in Table A.4.7.5.1.2-3.

Table A.4.7.5.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is o	only required to be tested in one of the supported test configurations

Table A.4.7.5.1.2-2: Test parameters for SFTD accuracy

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
	1,4		SR.1.1 FDD
PDSCH Reference measurement channel	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
	1,4		CCR.1.1 FDD
RMC CORESET Reference Channel	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD
	1,4		SSB.1 FR1
SSB configuration	2,5		SSB.1 FR1
	3,6		SSB.2 FR1

SMTC config	uration	1~6		SMTC.1
DL BWP configuration		1~6		DLBWP.1.1
UL BWP configuration		1~6		ULBWP.1.1
OCNG Patter	<u> </u>	1~6		OP.1
	f PSS to SSS	. 0		J
	f PBCH DMRS to SSS			
	f PBCH to PBCH DMRS			
	f PDCCH DMRS to SSS			
	f PDCCH to PDCCH DMRS	1~6	dB	0
	f PDSCH DMRS to SSS			-
	f PDSCH to PDSCH DMRS			
	f OCNG DMRS to SSS ^{Note 1}			
	f OCNG to OCNG DMRS Note 1			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
1 oc	NR_TDD_FR1_D	10	GDIII/ TORTIZ	- 107
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C NR_FDD_FR1_D,			
	NR_TDD_FR1_D	1,2,4,5		-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
N/ Note2	NR_FDD_FR1_H		dBm/SSB SCS	
$N_{oc}^{ m Note2}$	NR_FDD_FR1_A,		1	
	NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	3,6		-101
	NR_TDD_FR1_D	5,0		101
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
•	NR_FDD_FR1_H			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~6	dB	-3
\hat{E}_s/N_{oc}		1~6	dB	-3
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5		-107
	NR_TDD_FR1_D	, , ,-		
ee pepp	NR_FDD_FR1_E, NR_TDD_FR1_E			
SS-RSRP Note3	NR_FDD_FR1_G		dBm/SCS	
	NR FDD FR1 H			
	NR_FDD_FR1_H NR_FDD_FR1_A,		+	
	NR_TDD_FR1_A,			
	NR_FDD_FR1_B	_		
	NR_TDD_FR1_C	3,6		-104
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			

	NR FDD FR1 E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_TDD_FR1_D	1,2,4,0	GBITI/ 3.30 IVII 12	-74.20
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H			
10	NR_FDD_FR1_A,		dBm/38.16 MHz	-68.18
	NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	3,6		
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D	3,0	UDITI/30.10 WILIZ	-00.16
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagation	on condition	1~6		AWGN
	onfiguration	1~6		1x2
Note 1:	OCNG shall be used such that bo			tant total transmitted
	power spectral density is achieved			
Note 2:	Interference from other cells and r			
	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 beer	n derived from ot	her parameters for ir	nformation purposes. They
	are not settable parameters thems			
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at			
	each receiver antenna port.			

Table A.4.7.5.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.4.7.5.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and PSCell. The reported SFTD accuracy shall fulfil the requirement in section 9.1.27 in TS 36.133 [15].

A.4.7.5.2 Void

A.4.7.5.3 Void

A.4.8 Void

A.5 EN-DC tests with one or more NR cells in 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, 50 MHz bandwidth, TDD duplex	
	ı	mode	
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 50 MHz bandwidth, TDD duplex	
	2	mode	
Note:	e: The UE is only required to be tested in one of the supported test configurations depending on UE		
	capability		

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

Paramet	Parameter		Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	As defined in A.3.10, except for number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per SS	-burst		2	Different from the definition in A.3.10
SS/PBCH block index			0,1	Different from the definition in A.3.10
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 2	Config 1,2		SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SS	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	
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_D	MRS to SSS	dB		
EPRE ratio of PDSCH to	PDSCH_DMRS	dB		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.5.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

•	Parameter	Unit	Test-1	Comments
AoA setup			Setup 2b	As defined in A.3.15.2.2.
SSB with index 0	SSB_RP	dB	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp-ThresholdSSB
SSB with index 1	SSB_RP	dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured rsrp-ThresholdSSB
Configured ($P_{\mathrm{CMAX, f,c}}$)	UE transmitted power (dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.
PRACH Cor	nfiguration		FR2 PRACH configuration 1	As defined in A.3.8.3.
preambleReceivedTargetPower		dBm	-60	
Propagation	Condition		AWGN	
	o articial noise is applied in thoid.	is test.		

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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

A.5.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.5.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in 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 withPSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.2.1-2 and Table A.5.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.5.3.2.2.1-1: 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, 50 MHz bandwidth, TDD duplex			
	ı	mode			
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 50 MHz bandwidth, TDD duplex			
	2	mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations depending on UE			
	capability				

Table A.5.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parame	eter	Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	SSB pattern 1 in FR2	As defined in A.3.10, except of Number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per	SS-burst		2	2	Different from the definition in A.3.10
SS/PBCH block inde	×Χ		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.X TDD	SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Nun	nber		1	1	
EPRE ratio of PSS to	o SSS	dB			
EPRE ratio of PBCH	_DMRS to SSS	dB			
EPRE ratio of PBCH PBCH_DMRS	to	dB			
EPRE ratio of PDCC	H_DMRS to	dB		0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS		dB			
EPRE ratio of PDSC PDSCH_DMRS	H to	dB			

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.5.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parameter	Unit	Test-1	Test-2	Comments
AoA setup		Setup 2b	Setup 2b	As defined in A.3.15.2.2.
SSB with index 0	dB	[10] dB larger than SSB_RP for SSB index 1	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured <i>rsrp-</i> <i>ThresholdSSB</i>
SSB with index 1	dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-</i> <i>ThresholdSSB</i>
Configured UE transmitted power ($P_{\rm CMAX, f, c}$)	dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.
PRACH Configuration	-	FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3.
preambleReceivedTargetPowe	er dBm	-60	-60	
Propagation Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

A.5.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.5.3.2.2.2.1 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz			
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz			

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.1.1-2 and A.5.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.1.1-3.

Table A.5.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2	Freq1	Freq1	-
Duplex Mode		1,2	TI	DD	
TDD configuration		1,2	TDDC	onf.1.2	
BW _{channel}	MHz	1,2	100: NR	B,c = 66	
Initial BWP Configuration		1,2		VP.0.1 VP.0.1	
Dedicated BWP Configuration		1,2	DLBV	VP.1.1 VP.1.1	
TRS Configuration		1,2	TRS.2	.1 TDD	
TCI State		1,2	CSI-RS.	Config.0	
DRx Cycle	ms	1,2	N/A	DRX.5 ^{Note5}	
PDSCH Reference measurement channel		1,2	SR.3.	1 TDD	
CORESET Reference Channel		1,2	CR.3.	1 TDD	
OCNG Patterns		1,2	OCNG	oattern 1	
SSB Configuration		1,2		2 FR2	
SMTC Configuration		1,2	SM	TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1,2	1:	20	
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS	dB	1,2	0	0	
EPRE ratio of PBCH to PBCH DMRS	UD	1,4	0	U	
EPRE ratio of PDCCH DMRS to SSS					

EPRE ratio of PDCCH to				
PDCCH DMRS				
EPRE ratio of PDSCH				
DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH				
EPRE ratio of OCNG				
DMRS to SSS(Note 1)				
EPRE ratio of OCNG to				
OCNG DMRS (Note 1)				
Propagation condition	1,2	AW	GN	
SRS Config	1,2	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.3.3.5-1
- Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2	
Angle of arrival configuration		According to section A.3.15.1		
$N_{oc}^{ m Note1}$	dBm/15kHz ^{Note4}	-112		
$N_{oc}^{ m Note1}$	dBm/SCS ^{Note3}	-1	03	
\hat{E}_s/N_{oc}	dB	4		
SS-RSRP ^{Note2}	dBm/SCS Note4	-(99	
\hat{E}_{s}/I_{ot}	dB		4	
Io ^{Note2}	dBm/95.04 MHz Note4	-6	8.5	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

periodicity

Any 10 bit number

Config 2 Config1 Comments SRS-ResourceSet srs-ResourceSetId 0 0 srs-ResourceIdList 0 0 resourceType Periodic Periodic Usage Codebook Codebook SRS-Resource SRS-Resourceld 0 0 Port1 Port1 nrofSRS-Ports transmissionComb n2 n2 combOffset-n2 0 0 cyclicShift-n2 0 0 0 resourceMapping 0 startPosition resourceMapping n1 n1 nrofSymbols resourceMapping n1 n1 repetitionFactor freqDomainPosition 0 0 freqDomainShift 0 0 freqHopping sl1 sl1 c-SRS freqHopping 0 0 b-SRS freqHopping 0 0 b-hop groupOrSequenceHopping Neither Neither resourceType Periodic Periodic Offset to align with DRx periodicityAndOffset-p sl1,0 sl2560,0

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

Table A.5.4.1.1.1-4: Void

0

0

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.3.7.2.2-1 and setup NR PSCell according to parameters given in Table A.5.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792

sequenceld

- b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.1.2-1

Table A.5.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustme	ent Value
	Test1	Test2
240	+8*64T _c	+4*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Section 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.5.4.2 UE timer accuracy

A.5.4.3 Timing advance

A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

A.5.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in 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 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.5.4.3.1.2-1: Timing advance supported test configurations

	Config Description		
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex me		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note:	The UE is only required to be tested in one of the supported test configurations		

Table A.5.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	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	For 120 kHz SCS $N_{TA_new} = N_{TA_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance

Davamatar	l lmi4	Test1
Parameter	Unit	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
TRS configuration		TRS.2.1 TDD
TCI configuration		CSI-RS.Config.0
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	uБ	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)		
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.

Table A.5.4.3.1.2-3A: OTA related test parameters

Parameter Unit		Te	st 1		
			T1	T2	
Angle of	arrival configuration		According to section A.3.15.1		
$N_{oc}^{}$ Note 1		dBm/15kHz ^{Note4}	-1	12	
N_{oc} Note1		dBm/SCS ^{Note3}	-1	03	
\hat{E}_s/N_{od}	с	dB		4	
SS-RSRI	DNote2	dBm/SCS Note4	-99		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB		4	
Io ^{Note2}		dBm/95.04 MHz Note4	-6	8.5	
Note 1:	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:	Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone					

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	Eraguanay hanning in disabled
b-SRS	0	Frequency hopping is disabled
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting. SRS on last
nrofSymbols	n1	symbol of slot, and 1symbols for SRS
repetitionFactor	n1	without repetition.
combOffset-n2	0	transmissionComb setting
cyclicShift-n2	0	transmissionComb setting
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see cla	ause 6.3.2 in TS 38	3.331 [2].

A.5.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k = 11.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.5.5 Signaling characteristics

A.5.5.1 Radio link Monitoring

In the following 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 1.

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, 100 MHz bandwidth, TDD duplex mode		
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The U	JE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

	Paramete	•	Unit	Value
raiaineter			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Number			1	
Active PSCell RF Channel Number			Cell 2	
	imber	0		2
Duplex mode		Config 1, 2		TDD 00
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66
DL initial BWP		Config 1, 2		DLBWP.0.1
DL dedicated B configuration	OVVP	Config 1, 2		DLBWP.1.1
UL initial BWP	configuration	Config 1, 2		ULBWP.0.1
UL dedicated B		Config 1, 2		ULBWP.1.1
configuration	OVVE	Corning 1, 2		OLBWF.I.I
TDD Configura	tion	Config 1, 2		TDDConf.3.1
CORESET Ref		Config 1, 2		CR.3.1 TDD
Channel	Ciclioc	Coming 1, 2		GIV.3.1 1DD
SSB Configura	tion	Config 1, 2		SSB.1 FR2
SMTC Configur		Config 1, 2		SMTC.1
PDSCH/PDCC		Config 1, 2		120 KHz
spacing	i cabcamo.	001111g 1, 2		1201112
PRACH Config	uration	Config 1, 2		Table A.3.8.3.4
SSB index assi		Config 1, 2		0,1
RS	o .	J ,		,
OCNG parame	ters	1		OP.2
CP length				Normal
Correlation Mat	rix and Antenna	Configuration		2x2 Low
	DCI format	-		1-0
	Number of Co	ntrol OFDM		2
Out of sync	symbols			
transmission	Aggregation level		CCE	8
parameters		hetical PDCCH RE	dB	4
	energy to ave	rage SSS RE		
	energy			
		hetical PDCCH	dB	4
	•	to average SSS RE		
	energy	1 1		PEO 1 11 :
	DMRS precod			REG bundle size
DDV	REG bundle s	ize		6
DRX Con nottorn ID				OFF
Gap pattern ID Layer 3 filtering				gp0 Enabled
T310 timer			mc	0
T311 timer			ms	1000
N310			ms	1
N311			1	
CSI-RS for CSI reporting Config 1, 2			CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking Config 1, 2			TRS.2.1 TDD	
T1		S	0.2	
T2		S	9.68	
T3		S	9.68	
D1			s	9.64
	onfigurations ar	e assigned to the UE		
		is not transmitted after		
NUIC Z. UL-				

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

Paran	Unit		Test 1			
			T1	T2	T3	
AoA setup			Setup 3 defined in A.3.15			
EPRE ratio of PDCCH	DMRS to SSS	dB		4		
EPRE ratio of PDCCH	to PDCCH DMRS	dB	0			
EPRE ratio of PBCH D	MRS to SSS	dB				
EPRE ratio of PBCH to	PBCH DMRS	dB				
EPRE ratio of PSS to \$	SSS	dB				
EPRE ratio of PDSCH	DMRS to SSS	dB		0		
EPRE ratio of PDSCH	to PDSCH DMRS	dB				
EPRE ratio of OCNG [EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to	o OCNG DMRS	dB				
ssb-Index 0 SNR	Config 1, 2	dB	2 -6 -15			
ssb-Index 1 SNR	Config 1, 2		2	-15	-15	
SNR on other	Config 1, 2	dB	2			
channels and signals			_			
N_{oc}	Config 1, 2	dBm/1 5KHz	-92.1dBm			
Propagation condition		TD	L-A 30ns 75	Hz		
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM						

otal transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

The SNR values are specified for testing a UE which supports 2RX on at least Note 4: 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 1	
Field	Value	
gapOffset	0	
	ame boundary aligned. SS is partially overlapped with	

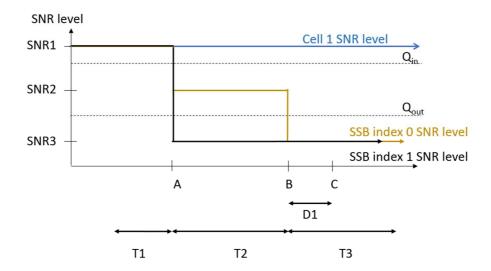


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Description			
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The l	JE 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

Active E-UTRA PCell		Paramete	,	Unit	Value
Active E-UTRA PCell	i arannetei		- Oilii		
E-UTRA RF Channel Number					10011
Active PSCell				Ce1l 1	
RF Channel Number		nannel Number			
Duplex mode					
BW Consequent Config 1, 2		umber	Т -		_
DL initial BWP configuration Config 1, 2 DLBWP.0.1					
DL dedicated BWP Config 1, 2					100: N _{RB,c} = 66
Configuration					
UL initial BWP configuration Config 1, 2		BWP	Config 1, 2		DLBWP.1.1
U.L. dedicated BWP		configuration	Config 1 0		LII DWD O 4
CONFIGURATION					
TDD Configuration			Corning 1, 2		OLBWF.1.1
CORESET Reference		ntion	Config 1 2		TDDConf 3.1
Channel SSB Configuration Config 1, 2 SSB.1 FR2			Config 1, 2		
SSB Configuration		.0.000	Johning 1, 2		014.6.1 122
SMTC Configuration		ition	Config 1, 2		SSB.1 FR2
PDSCH/PDCCH subcarrier Config 1, 2 120 KHz					
Spacing			Config 1, 2		
PRACH Configuration	spacing				
RS			Config 1, 2		Table A.3.8.3.4
OCNG parameters OP.2 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low In sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 Aggregation level CCE 4 Ratio of hypothetical PDCCH RE energy to average SSS RE energy dB 0 DMRS energy to average SSS RE energy B 0 DMRS precoder granularity REG bundle size 6 Out of sync transmission parameters DCI format 1-0 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average SSS RE energy dB 4 Ratio of hypothetical PDCCH RE energy to average SSS RE energy dB 4 Ratio of hypothetical PDCCH Be energy to average SSS RE energy dB 4 Ratio of hypothetical PDCCH Be energy to average SSS RE energy REG bundle size 6 DRX OFF 6 Gap pattern ID N.A. N.A. Layer 3 filtering Enabled T310 timer ms 4000	SSB index ass	igned as RLM	Config 1, 2		0,1
CP length			-		
Correlation Matrix and Antenna Configuration		eters			
DCI format					
Number of Control OFDM symbols			Configuration		
Aggregation level					
Ratio of hypothetical PDCCH RE energy to average SSS RE energy				225	
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	parameters				
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy				aB	0
DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size REG bundle size G Color format Co				4D	0
energy				uБ	O .
DMRS precoder granularity REG bundle size 6			to avolago coo NE		
REG bundle size			er granularity		RFG bundle size
Out of sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average SSS RE energy dB 4 PMRS energy to average SSS RE energy dB 4 DMRS precoder granularity REG bundle size 6 DRX OFF 0FF Gap pattern ID N.A. Enabled Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 1 N310 1 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2 TCI.State.2					
transmission parameters Number of Control OFDM symbols 2 Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average SSS RE energy dB 4 DMRS energy to average SSS RE energy AB 4 DMRS precoder granularity REG bundle size REG bundle size DRX OFF Gap pattern ID N.A. N.A. Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 1 N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2 TCI.State.2	Out of sync				1-0
Parameters		Number of Co	ntrol OFDM symbols		2
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	parameters			CCE	8
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size 6 EG bundle size 6 EG bundle size 6 EG bundle size Enabled Enabled Enabled Enabled Enabled Enabled Enabled Enabled Enabled EG bundle size Enabled Enabled Enabled Enabled Enabled Enabled EG bundle size Enabled EG bundle size Enabled Ena		Ratio of hypotl	netical PDCCH RE	dB	4
DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size 6					
energy DMRS precoder granularity REG bundle size 6 DRX OFF Gap pattern ID N.A. Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2				dB	4
DMRS precoder granularity REG bundle size 6		•	to average SSS RE		
REG bundle size 6 DRX OFF Gap pattern ID N.A. Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2			1 1		DE0.1 " .
DRX OFF Gap pattern ID N.A. Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2		, ,			
Gap pattern ID N.A. Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2					
Layer 3 filtering Enabled T310 timer ms 4000 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2					
T310 timer ms 4000 T311 timer ms 1000 N310 1 N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2					
T311 timer ms 1000 N310 1 N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2			me		
N310 1 N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2					
N311 1 CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2				1113	
CSI-RS for CSI reporting Config 1, 2 CSI-RS.3.1 TDD TCI states for PDCCH/PDSCH TCI.State.2				 	
TCI states for PDCCH/PDSCH TCI.State.2		I reporting	Config 1, 2		
			Config 1, 2		TRS.2.1 TDD

T1	S	0.2
T2	S	0.2
T3	S	1.88
T4	S	0.2
T5	S	3.84
D1	S	3.8

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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

Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Paran	Unit			Test 1			
			T1	T2	Т3	T4	T5
AoA setup	AoA setup			Setup 3	defined i	in A.3.15	
EPRE ratio of PDCCH D	MRS to SSS	dB			4		
EPRE ratio of PDCCH to	PDCCH DMRS	dB			0		
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to F	PBCH DMRS	dB]				
EPRE ratio of PSS to SS	SS	dB]				
EPRE ratio of PDSCH D	MRS to SSS	dB	0				
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DN	dB						
EPRE ratio of OCNG to	OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	2	-6	-15	-4.5	2
ssb-Index 1 SNR	Config 1, 2		2 -15 -15 -15 -15		-15		
SNR on other channels Config 1, 2		dB	2				
and signals							
N_{oc}	Config 1, 2	dBm/1 5KHz	-92.1dBm				
Propagation condition	•		TDL-A 30ns 75Hz				

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

SNR1, SNR5 SNR4 SNR2 SNR3 A B C D E F D1 SSB index 0 SNR level Cell 1 SNR level Q_{in} SSB index 1 SNR level

Table A.5.5.1.2.1-4: Void

Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

T3

T4

T5

A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

T1 T2

A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description			
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2 TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mod				
Note: The l	JE 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
Astina E LITDA DOSII				Test 1
Active E-UTRA PCell				Cell 1
E-UTRA RF Channel Number				1
Active PSCell				Cell 2
RF Channel Nu	ımber	Confin 4 0		2
Duplex mode		Config 1, 2		TDD
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1 DLBWP.1.1
DL dedicated E	BWP	Config 1, 2		DLBWP.1.1
configuration UL initial BWP	aanfiauratian	Config 1 2		LII DWD 0.4
UL dedicated E		Config 1, 2		ULBWP.0.1
	SVVP	Config 1, 2		ULBWP.1.1
configuration	tion	Config 1 0		TDDConf 2.4
TDD Configura		Config 1, 2		TDDConf.3.1
CORESET Ref	erence	Config 1, 2		CR.3.1 TDD
Channel SSB Configura	tion	Config 1 2		QQD 4 ED0
SMTC Configura		Config 1, 2		SSB.1 FR2
PDSCH/PDCC		Config 1, 2 Config 1, 2		SMTC.1 120 KHz
	n subcarrier	Corning 1, 2		12U KMZ
spacing PRACH Config	uration	Config 1, 2		Table A.3.8.3.4
SSB index assi		Config 1, 2		
SSD IIIUEX ASSI RS	gried as KLIVI	Corning 1, 2		0,1
OCNG parame	toro			OP.1
	leis			Normal
CP length	trix and Antenna	Configuration		
Jorrelation Ma	ırıx and Antenna	Configuration		2x2 Low
Out of sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE	dB	4
	energy to aver	age SSS RE energy		
	Ratio of hypot	netical PDCCH	dB	4
	DMRS energy	to average SSS RE		
	energy			
	DMRS precod	er granularity		REG bundle size
	REG bundle s	ze		6
ORX Configura				DRX.3
Gap pattern ID				N.A.
ayer 3 filtering	<u> </u>			Enabled
Γ310 timer			ms	0
Γ311 timer			ms	1000
N310				1
N311			1	
CSI-RS for CS	reporting	Config 1, 2		CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH				TCI.State.2
CSI-RS for tracking Config 1, 2				TRS.2.1 TDD
T1	<u> </u>		S	0.2
T2			S	14.48
T3			S	14.48
D1			S	14.44
			-	

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

Table A.5.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

Paramet	Unit					
			T1	T2	Т3	
AoA setup		Setup 1 defined in A.3.15				
EPRE ratio of PDCCH DM	IRS to SSS	dB	4			
EPRE ratio of PDCCH to I	PDCCH DMRS	dB	0			
EPRE ratio of PBCH DMR	S to SSS	dB				
EPRE ratio of PBCH to PE	3CH DMRS	dB				
EPRE ratio of PSS to SSS	3	dB				
EPRE ratio of PDSCH DM	IRS to SSS	dB		0		
EPRE ratio of PDSCH to F	dB					
EPRE ratio of OCNG DMF	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB				
ssb-Index 0 SNR	Config 1, 2	dB	2	-6	-15	
ssb-Index 1 SNR	Config 1, 2		2	-15	-15	
SNR on other channels and signals	Config 1, 2	dB	2			
N_{oc}	Config 1, 2	dBm/15K Hz	-104.7dBm			
Propagation condition		TDL-A 30ns 75Hz				
Note 1: OCNG shall be	used such that the	resources in C	Cell 2 are fully a	Illocated and a co	nstant total	

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

Table A.5.5.1.3.1-4: Void Table A.5.5.1.3.1-5: Void

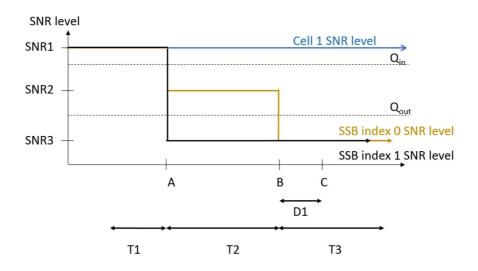


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration Description			
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Paramete	er	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP Config 1, 2 configuration			ULBWP.1.1
TDD Configuration Config 1, 2			TDDConf.3.1

CODECET Det	0.0000	Confin 1 0	<u> </u>	CD 2.4 TDD
CORESET Reference		Config 1, 2		CR.3.1 TDD
Channel SSB Configuration		Config 1, 2		SSB.1 FR2
SMTC Configuration		Config 1, 2		SMTC.3
PDSCH/PDCCH subcarrier		Config 1, 2		120 KHz
spacing	i i subcamei	Coming 1, 2		IZO KIIZ
PRACH Config	uration	Config 1, 2		Table A.3.8.3.4
SSB index assi		Config 1, 2		0,1
RS	griod do rtzivi	001111g 1, 2		5,1
OCNG parame	ters			OP.1
CP length				Normal
	trix and Antenna	Configuration		2x2 Low
In sync	DCI format	<u> </u>		1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
		netical PDCCH RE	dB	0
		age SSS RE energy		
	Ratio of hypoth		dB	0
	DMRS energy	to average SSS RE		
	energy			
	DMRS precode			REG bundle size
	REG bundle si	ze		6
Out of sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation level		CCE	8
		netical PDCCH RE	dB	4
	energy to average SSS RE energy			
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size			dB	4
		to average SSS RE		
				DEO harrelle e'e-
			REG bundle size	
				6
DRX Configuration				DRX.11 N.A.
	Gap pattern ID			
Layer 3 filtering T310 timer]			Enabled 4000
T311 timer			ms	4000 1000
N310			ms	1
N311				1
	I reporting	Config 1 2		CSI-RS.3.1 TDD
TCI states for E	CSI-RS for CSI reporting Config 1, 2 TCI states for PDCCH/PDSCH			TCI.State.2
CSI-RS for tracking Config 1, 2				TRS.2.1 TDD
T1 Config 1, 2			e	0.2
T2			S S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88
D1			S	3.84
	onfigurations are	assigned to the UE p		
		is not transmitted afte		
		ORX mode under test.		

Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring test in DRX mode

Para	Unit	Test 1						
			T1	T2	T3	T4	T5	
AoA setup			Setup 1	defined	l in A.3.1	15		
EPRE ratio of PDCCH	DMRS to SSS	dB			4			
EPRE ratio of PDCCH	to PDCCH DMRS	dB		0				
EPRE ratio of PBCH D	MRS to SSS	dB						
EPRE ratio of PBCH to	PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB						
EPRE ratio of PDSCH	DMRS to SSS	dB			0			
EPRE ratio of PDSCH	dB							
EPRE ratio of OCNG I	DMRS to SSS	dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
ssb-Index 0 SNR Config 1, 2		dB	2	-6	-15	-4.5	2	
ssb-Index 1 SNR	Config 1, 2		2	-15	-15	-15	-15	
SNR on other	Config 1, 2	dB			2			
channels and signals								
N_{oc} Config 1, 2		dBm/1 5KHz	-104.7dBm					
Propagation condition			TDL-A 30ns 75Hz					
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.								
Note 2: The signal contains PDCCH for UEs other than the device under test as part of								

OCNG.3

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

> Table A.5.5.1.4.1-4: Void Table A.5.5.1.4.1-5: Void

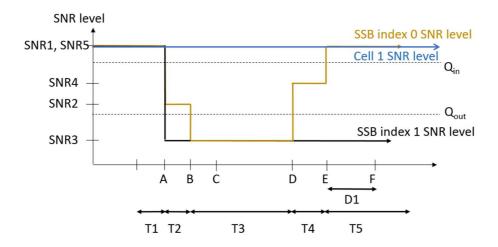


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

A.5.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.5.1-1, A.5.5.1.5.1-2, A.5.5.1.5.1-3 and A.5.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

Configuration Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex n				
Note: The UE is only	ote: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

P	arameter	Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel N	lumber		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex Mode			TDD	
TDD Configuration	Config 1		TDDConf.3.1	
	Config 2		TDDConf.3.1	

Description Config 1, 2 Dispersion D	DL initial BWP	Config 1, 2		DLBWP.0.1
DL dedicated BWP Config 1, 2 ULBWP.1.1		Corning 1, 2		DEBWF.0.1
configuration Config 1, 2 UL BWP.0.1 UL dedicated BWP configuration Config 1, 2 ULBWP.0.1 RMC CORESET Reference Channel Config 1 CCR.3.1 TDD CCR.3.2 TDD CCR.3.2 TDD CCR.3.2 TDD CCR.3.2 TDD CCR.3.2 TDD CCR.3.2 TDD SSB Configuration SMTC Configuration Config 1 SSB.1 FR2		Config 1 2		DI RWP 1 1
UL initial BWP configuration UL dedicated BWP configuration UL dedicated BWP configuration Config 1, 2 ULBWP.1.1	o ,			DLDWI .I.I
Configuration				LILBWP 0 1
ULBWP.1.1 Config 1, 2 ULBWP.1.1		Corning 1, 2		OLDWI .O. I
Configuration RMC CORESET Reference Channel Config 2		Config 1 2		LILRWP 1 1
RMC CORESET Reference Channel Config 1		Coming 1, 2		OLDWI .I.I
Reference Channel		Config 1		CCP 3 1 TDD
Config 2		Comig		
CCR.3.2 TDD	Treference Charmer	Config 2		
SSB Configuration		Sorning 2		
SMTC Configuration	SSR Configuration	Config 1		
SMTC Configuration	33B Configuration			
Config 2	SMTC Configuration			
PDSCH/PDCCH Subcarrier spacing Config 1 120 KHz	Sivi 10 Configuration			
Subcarrier spacing				
CSI-RS for RLM		Config 1		120 KHz
TDD	subcarrier spacing	Config 2		120 KHz
TDD	CSI-RS for DLM	•		Resource #4 in TDS 2.1
Resource #4 in TRS.2.2 TDD	COITING TOT INLINI	Corning 1, 2		
TDD TRS configuration				
TRS configuration				
TRS.2.2 TDD	TPS configuration			
TCI configuration for PDCCH#1/PDSCH TCI.State.2	1103 configuration			
TCI configuration for PDCCH#2 TCI.State.3	TCI configuration for P	DCCH#1/DDSCH		
OCNG parameters OP.1 CP length Normal Correlation Matrix and Antenna Configuration 2x2 Low Out of sync transmission parameters DCI format 1-0 Number of Control OFDM symbols 2 Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy dB 4 Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy dB 4 DRX OFF 0FF Gap pattern ID gp0 0 Layer 3 filtering Enabled 0 T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1 CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.35				
CP length Normal		DCCI 1#2		
DCI format				
DCI format		Antonna Configuration		
Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Red bundle size General Siz	Correlation Matrix and	Antenna Configuration		ZXZ LOW
Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Red bundle size General Siz	Out of sync	DCI format		1-0
Parameters Symbols Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy REG bundle size EG DMRS precoder granularity REG bundle size EG DRX OFF Gap pattern ID Gp0 Enabled Enabled T310 timer ms				
Aggregation level CCE 8 Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size 6 DRX OFF Gap pattern ID Gap Gap				
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy PMRS energy to average CSI-RS RE energy REG bundle size REG bundle		symbols		
RE energy to average CSI-RS RE energy		,	CCE	8
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy REG bundle size		Aggregation level		
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy		Aggregation level Ratio of hypothetical PDCCH		
DMRS energy to average CSI-RS RE energy		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-		
DMRS energy to average CSI-RS RE energy		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-		
DMRS precoder granularity REG bundle size		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	4
DMRS precoder granularity REG bundle size		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH	dB	4
DMRS precoder granularity REG bundle size 6 0 0 0 0 0 0 0		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	4
DMRS precoder granularity REG bundle size 6 0 0 0 0 0		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	4
DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 CSI-RS for CSI reporting Config 1 CSI-RS.3.1 TDD reporting Config 2 CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
DRX OFF Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 CSI-RS for CSI reporting Config 1 CSI-RS.3.1 TDD reporting Config 2 CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
Gap pattern ID gp0 Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 CSI-RS for CSI reporting Config 1 CSI-RS for CSI reporting Config 2 CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31		Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	4 REG bundle size
Layer 3 filtering Enabled T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31	parameters	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	4 REG bundle size 6
T310 timer ms 0 T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS for CSI reporting Config 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31	parameters	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	4 REG bundle size 6 OFF
T311 timer ms 1000 N310 1 1 N311 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD CSI-RS.3.1 TDD T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31	DRX Gap pattern ID	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	4 REG bundle size 6 OFF gp0
N310 1 N311 1 CSI-RS for CSI reporting Config 1 Config 2 T1 \$ 0.2 T2 \$ 0.35 T3 \$ 0.35 D1 \$ 0.31	DRX Gap pattern ID Layer 3 filtering	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	4 REG bundle size 6 OFF gp0 Enabled
N311 1 CSI-RS for CSI reporting Config 1 Config 2 CSI-RS.3.1 TDD T1 \$ 0.2 T2 \$ 0.35 T3 \$ 0.35 D1 \$ 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0
CSI-RS for CSI reporting Config 1 Config 2 CSI-RS.3.1 TDD CSI-RS.3.1 TDD T1 \$ 0.2 T2 \$ 0.35 T3 \$ 0.35 D1 \$ 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0
reporting Config 2 CSI-RS.3.1 TDD T1 \$ 0.2 T2 \$ 0.35 T3 \$ 0.35 D1 \$ 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0 1000
T1 s 0.2 T2 s 0.35 T3 s 0.35 D1 s 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1
T2 s 0.35 T3 s 0.35 D1 s 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD
T3 s 0.35 D1 s 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1	dB dB	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD
D1 s 0.31	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI reporting T1	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1	dB dB ms	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD 0.2
	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI reporting T1	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1	dB dB ms ms	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD 0.2
	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI reporting T1 T2	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1	dB dB ms ms s s	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD 0.2 0.35
	DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI reporting T1 T2 T3 D1	Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Config 1 Config 2	dB dB ms ms s s s s s	4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD 0.2 0.35 0.35

Note 2: E-UTRAN is in non-DRX mode under test.

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

Para	Parameter Unit			Test 1	
			T1 T2 T3		
PDCCH_be	eta	dB		4	
PDCCH_DI		dB		4	
PBCH_beta	à	dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_be	eta	dB			
OCNG_bet	а	dB			
SNR on RLM-RS1	Config 1,2	dB	2	-6	-15
SNR on RLM-RS2	Config 1,2		2	-14	-15
SNR on other channels and signals	Config 1,	dB		2	
N_{oc}	Config 1 Config 2	dBm/15KHz	TBD		
Propagation	n condition		[TDL-A 30ns 75Hz]		

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The 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.5.5.1.5.1-3A: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field	Test 1	
	riela		
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is	

Table A.5.5.1.5.1-4: Void

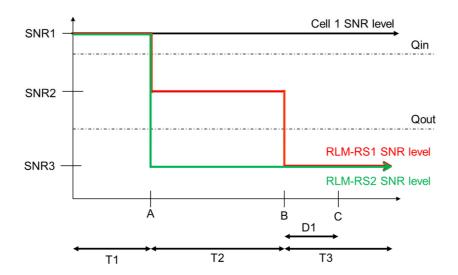


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.6.1-1, A.5.5.1.6.1-2, and A.5.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.6.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Char			1
Active PSCell			Cell 2
RF Channel Num	ber		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2	1	TDDConf.3.1
DL initial BWP	Config 1, 2		DLBWP.0.1
configuration	351ig 1, 2		DEB111 10.1
DL dedicated	Config 1, 2		DLBWP.1.1
BWP	33g ., _		
configuration			
UL initial BWP	Config 1, 2		ULBWP.0.1
configuration	, ,		
UL dedicated	Config 1, 2		ULBWP.1.1
BWP	, ,		
configuration			
RMC CORESET	Config 1		CCR.3.1 TDD
Reference			CCR.3.2 TDD
Channel	Config 2	7	CCR.3.1 TDD
	-		CCR.3.2 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2	1	SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2	1	SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	Config 2]	120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
OCNG parameter			OP.1
TRS configuration	<u> </u>		TRS.2.1 TDD
			TRS.2.2 TDD
	for PDCCH#1/PDSCH		TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
CP length			Normal
Correlation Matrix	and Antenna		2x2 Low
Configuration			
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311	1 -		1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: UE-spe	ecific PDCCH is not transmi	tted after T1 sta	irts.
Note 2: E-UTRA	N is in non-DRX mode unde	er test.	

Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
PDCCH_beta		dB			4		
PDCCH_DMRS	S_beta	dB			4		
PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB	1		0		
PDSCH_beta		dB					
OCNG_beta		dB					
SNR on	Config 1, 2	dB	2	-6	-15	-4.5	2
RLM-RS1							
SNR on	Config 1, 2	dB	2	-14	[-15]	[-15]	-14
RLM-RS2							
SNR on other							
channels and	Config 1, 2	dB	2				
signals							
N_{oc}	Config 1, 2	dBm/15KHz			TBD		
Propagation co	ndition			[TI	[TDL-A 30ns 75Hz]		

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

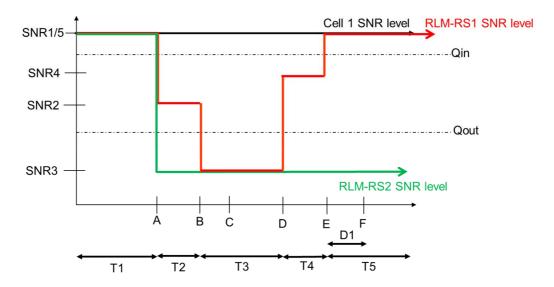


Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.7.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.7.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Cha			1
Active PSCell	annor rumbor		Cell 2
RF Channel Nur	mber		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2		TDDConf.3.1
DL initial BWP	· ·		
configuration	Config 1, 2		DLBWP.0.1
DL dedicated			
BWP	Config 1, 2		DLBWP.1.1
configuration	Johns 1, 2		DEBWI
UL initial BWP			
configuration	Config 1, 2		ULBWP.0.1
UL dedicated			
BWP	Config 1, 2		ULBWP.1.1
configuration	J ,		
RMC	Config 1		CCR. 3.1 TDD
CORESET			CCR.3.2 TDD
Reference	Config 2		CCR. 3.1 TDD
Channel			CCR.3.2 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDCC	Config 1		120 KHz
H subcarrier	Config 2		120 KHz
spacing	Corning 2		120 KHZ
CSI-RS for	Config 1, 2		Resource #4 in TRS.2.1 TDD
RLM			Resource #4 in TRS.2.2 TDD
TRS configuration	on		TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration	n for		TCI.State.2
	PDCCH#1/PDSCH		
TCI configuration for PDCCH#2			TCI.State.3
	OCNG parameters		OP.1
CP length			Normal
	Correlation Matrix and Antenna		2x2 Low
	Configuration		
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
Paramotoro	Aggregation level	CCE	8
L	/ iggregation level	JUL	U

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for	Config 1		CSI-RS.3.1 TDD	
CSI reporting	Config 2		CSI-RS.3.1 TDD	
T1		S	0.2	
T2		S	1.28	
T3		S	1.28	
D1		S	1.24	
Note 1: UF-st	pecific PDCCH is not tran	smitted after T1	starts	

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit		Test 1	
			T1	T2	T3
PDCCH_beta		dB		4	
PDCCH_DMRS	S_beta	dB		4	
PBCH_beta		dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_beta		dB			
OCNG_beta		dB			
SNR on RLM- RS1	Config 1, 2	dB	2	-6	[-15]
SNR on RLM- RS2	Config 1, 2		2	-14	[-15]
SNR on other channels and signals	Config 1, 2	dB	2		
λ/ Config 1		dBm/15KHz		-104.7	
N_{oc}	Config 2			-104.7	
Propagation co	ndition			ΓDL-A 30ns 75H	z]

- 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
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.5.5.1.7.1-3A: Void

Table A.5.5.1.7.1-4: Void

Table A.5.5.1.7.1-5: Void

Table A.5.5.1.7.1-6: Void

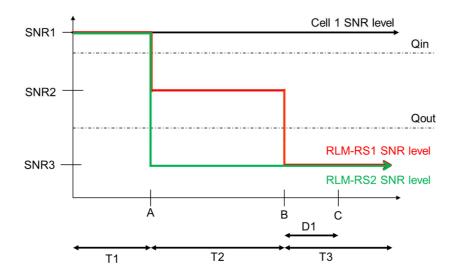


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.7.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.8.1-1, A.5.5.1.8.1-2, A.5.5.1.8.1-3 and A.5.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.8.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
	hannel Number		1
Active PSCell			Cell 2
RF Channel N	umber		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuratio n	Config 2		TDDConf.3.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration RMCCORES ET	Config 1		CCR.3.1 TDD CCR.3.2 TDD
Reference Channel	Config 2		CCR.3.1 TDD CCR.3.2 TDD
SSB	Config 1		SSB.1 FR2
Configuratio n	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuratio n	Config 2		SMTC.1
PDSCH/PD	Config 1		120 KHz
CCH subcarrier spacing	Config 2		120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
_	TRS configuration		TRS.2.1 TDD TRS.2.2 TDD
	ion for PDCCH#1/PDSCH		TCI.State.2
	ion for PDCCH#2		TCI.State.3
OCNG parame	eters		OP.1
CP length			Normal

Correlation Ma Configuration	atrix and Antenna		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		2
pa.a	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE		
	energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE		
	energy	ID.	
	Ratio of hypothetical PDCCH DMRS energy to	dB	0
	average CSI-RS RE		
	energy		
			REG bundle size
	DMRS precoder granularity		REG buildle size
	REG bundle size		6
DRX			DRX.3
Gap pattern IE			gp0
Layer 3 filterin	g		Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for	Config 1	<u> </u>	CSI-RS.3.1 TDD
CSI	Config 2		CSI-RS.3.1 TDD
reporting T1		6	0.2
T2		S S	0.2
T3		S	1.64
T4		S	0.2
T5		S	1.88
D1		S	1.84
	specific PDCCH is not transmitte	-	

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
PDCCH_beta	dB			4		
PDCCH_DMRS_beta	dB			4		

PBCH_beta		dB					
PSS_beta		dB					
SSS_beta		dB	0				
PDSCH_beta		dB					
OCNG_beta		dB					
SNR on RLM-RS1	Config 1, 2	dB	2	-6	[-15]	[-4.5]	2
SNR on RLM-RS2	Config 1, 2	dB	2	-14	[-15]	[-15]	-14
SNR on other channels and signals	Config 1, 2	dB	2				
N_{oc}	Config 1, 2	dBm/15KHz	-104.7				
Propagation co	ndition			[T[DL-A 30ns 75	Hz]	

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.5.5.1.8.1-3A: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

Field		Test 1
	rieid	Value
	gapOffset	0
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

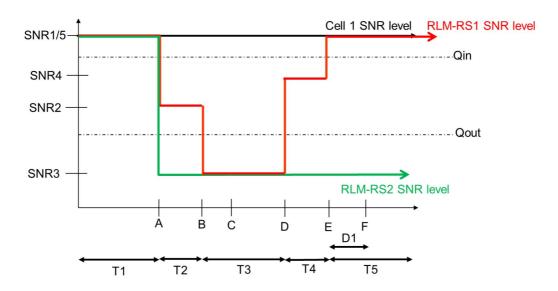


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly, under the condition that the SSB is with different numerology as the PDCCH/PDSCH.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

Configuration	Description
1	FDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex
	mode
2	TDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex
	mode
Note: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1, 2	1 and 2	1 for NR PSCell and 2 for LTE PCell
SSB configuration		1, 2	SSB.1 FR2	
SMTC configuration		1, 2	SMTC	
			pattern 1	
DRX cycle length	S	1, 2	OFF	
T1	S	1, 2	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Ce	II 2
		configuration	AoA1	Ao A2
TDD configuration		1, 2	TDDConf.3.1	
PDSCH RMC		1, 2	SR.3.1 TDD	Not sent
configuration				
RMSI CORESET		1, 2	CR.3.1	Not sent
RMC configuration				
Dedicated CORESET		1, 2	CCR.3.2	Not sent
RMC configuration				
TRS configuration		1, 2 1, 2	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1, 2	TCI.State.2	Not sent
state				
OCNG Pattern		1, 2	OP.1 defined in	Not sent
			A.3.2.1	
Initial DL BWP		1, 2	DLBWP.0.1	
configuration				
Initial UL BWP		1, 2	ULBWP.0.1	
configuration				
RLM-RS		1, 2	TRS.2.1 TDD	TRS.2.2 TDD
AoA setup		1, 2	Setup 3 define	ed in A.3.15.3
$\mathbf{\hat{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$	dB	1, 2	3	N/A
N_{oc} Note2	dBm/SCS	1, 2	-84.9	Not sent
\hat{E}_s/N_{oc}	dB	1, 2	3	N/A
SS-RSRP Note3	dBm/SCS	1, 2	-81.9	-81.9
lo	dBm/95.04 MHz	1, 2 1, 2 1, 2	-51.15	-52.91
Propagation		1, 2	AW	GN
Condition				

A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.5.5.2 Interruption

A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in 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 has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.5.5.2.1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.4	DRX related parameters are defined in
		DNA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.5.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to PE EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PE EPRE ratio of PDSCH to PE EPRE ratio of OCNG DMRS EPRE ratio of OCNG to OCI	CH DMRS S to SSS DCCH DMRS S to SSS DSCH S to SSS(Note 1)	dB	0
Ê _s /N _{oc}			17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
			-

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

	Parameter	Unit	Cell2			
Angle of	arrival configuration		According to section A.3.15.1			
$N_{oc}^{}$ Note1		dBm/15kHz ^{Note4}	-112			
N_{oc} Note1		dBm/SCS ^{Note3}	-102.97			
\hat{E}_s/N_o	c	dB	17			
SS-RSRI	DNote2	dBm/SCS Note4	-85.97			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17			
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90			
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power					
	for N_{oc} to be fulfilled.					
Note 2: SS-RSRP and lo levels have been derived from other parameters for information						
Note 3:	purposes. They are not settable parameters themselves. e 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					
Note 4:	· ·					
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone			

Table A.5.5.2.1.1-5: Void

A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in 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 has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex n		
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.6	DRX related parameters are defined in
		DKX.0	Table A.3.3.6-1
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

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to 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 Ê _s /N _{oc}	CH DMRS S to SSS DCCH DMRS S to SSS DSCH S to SSS DSCH S to SSS(Note 1)	dB dB	0
Propagation Condition	Propagation Condition		AWGN
Time offset to cell1 Note 2		ms	3
Time diser to cert have			J J

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

	Parameter	Unit	Cell2		
Angle of	arrival configuration		According to section A.3.15.1		
$N_{oc}^{}$ Note 1		dBm/15kHz ^{Note4}	-112		
N_{oc} Note1		dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_{od}	2	dB	17		
SS-RSRI	ONote2	dBm/SCS Note4	-85.97		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:	constant over subcarriers and time and shall be modelled as AWGN of appropriate po				
	for N_{oc} to be fulfilled	d.			
Note 2:	Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:	Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4: 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				

Table A.5.5.2.2.1-5: Void

A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in 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 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. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-2. In the test there are three cells: Cell1 Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 is NR FR2 PSCell and NR FR2 deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.3.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

	Config	Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.5.5.2.3.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		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		Oll	
SCell measurement cycle	Ms	640	
(measCycleSCell)	IVIS	040	
T1	S	10	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	eter	Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
•	,			
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP				
Configuration	Config 1,2		DLBWP.0.1	DLBWP.0.1
Downlink dedicated				
BWP Configuration	Config 1,2		DLBWP.1.1	DLBWP.1.1
Uplink initial BWP	0 " 10		1 11 D 14 D 0 4	514/5 6 4
configuration	Config 1,2		ULBWP.0.1	ULBWP.0.1
Uplink dedicated BWP	Config 1 2		ULBWP.1.1	ULBWP.1.1
configuration	Config 1,2		ULBVVP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,2		SR.3.1 TDD	_
measurement channel	Corning 1,2		31X.3.1 TDD	
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
Reference Channel	Corning 1,2		CR.S.T TDD	CIX.5.1 TDD
PDCCH CORESET	Config 1,2		CCR 3.1 TDD	CCR 3.1 TDD
parameters	Corning 1,2			
OCNG Patterns			OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS	<u> </u>			
EPRE ratio of PBCH DMRS	S to SSS			
EPRE ratio of PBCH to PB				
EPRE ratio of PDCCH DMRS to SSS			0	
EPRE ratio of PDCCH to PDCCH DMRS		dB		0
EPRE ratio of PDSCH DMRS to SSS		1		
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)			ANA/CA1	AVA/CAL
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	3	3
Time offset to cell1 Note 3		μs	-	3
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power				

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

Para	ameter	Unit	Cell 2	Cell 3
			Setup 1 defined	Setup 1 defined
Angle of arrival configuration			in section	in section
			A.3.15.1	A.3.15.1
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc}^{Note1}	NR_TDD_FR2_F	dBm/15kHz	-112	-105
	NR_TDD_FR2_G	UDITI/ TOKITZ	-112	-103
	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 ^{Note}	-103	-96
	NR_TDD_FR2_G	3	-103	-90
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B		-86	-86
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS		
33-K3KF	NR_TDD_FR2_G	Note4		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B		17	10
\hat{E}_{s}/I_{ot}	NR_TDD_FR2_F	dB		
L _s /L _{ot}	NR_TDD_FR2_G	ub_		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
\hat{E}_s/N_{oc}	NR_TDD_FR2_F	dB	17	10
L _S /1V _{OC}	NR_TDD_FR2_G	(ID	1 /	10
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B	_		
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-59.4	-59.4
10 ***	NR_TDD_FR2_G	MHz Note4		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-1 and Table A.5.5.2.3.2-2.

Table A.5.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.3.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe for synchronous interband EN-DC.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in 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* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.4.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

Config	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only re	te: The UE is only required to be tested in one of the supported test configurations	

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
•				
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP			. DI DIME	0.4
Configuration	Config 1,2		DLBWP	.0.1
Downlink dedicated	Confin 4.0		DI DIME	4.4
BWP Configuration	Config 1,2		DLBWP	.1.1
Uplink initial BWP	Config 1.2		ULBWP	0.1
configuration	Config 1,2		ULBWP	.0.1
Uplink dedicated BWP	Config 1,2		ULBWP	.1.1
configuration	0011119 1,2		025***	····
PDSCH Reference	Config 1,2		SR.3.1 TDD	-
measurement channel	3 ,			
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
Reference Channel				
PDCCH CORESET	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD
parameters	1	+	OP.1	OP.1
OCNG Patterns	1	+		
SSB Configuration	0		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state EPRE ratio of PSS to SSS	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSCH DMRS	2 to 222	-		
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMRS to SSS		1		0
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)				
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		ms	3	3
Time offset to cell1 Note 3		μs	- allocated and a constant t	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

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

Par	ameter	Unit	Cell 2	Cell 3	
			Setup 1 defined	Setup 1 defined	
Angle of arrival con	figuration		in section	in section	
			A.3.15.1	A.3.15.1	
	NR_TDD_FR2_A				
37	NR_TDD_FR2_B	_			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz	-112	-105	
	NR_TDD_FR2_G			100	
	NR_TDD_FR2_T	_			
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A	-			
3.7 Noted	NR_TDD_FR2_B				
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	-103	-96	
	NR_TDD_FR2_G	-			
	NR_TDD_FR2_T	-			
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A	_	-86	-86	
	NR_TDD_FR2_B	-ID (0.00			
SS-RSRP ^{Note2}	NR_TDD_FR2_F NR_TDD_FR2_G	dBm/SCS Note4			
	NR TDD_FR2_G	-			
	NR_TDD_FR2_Y	-			
△ /-	NIN_TOD_LINZ_T				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	17	10	
\hat{E}_s/N_{oc}		dB	17	10	
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-59.4	-59.4	
10	NR_TDD_FR2_G	MHz Note4	-55.4	-59.4	
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
Note 1: Interference from other cells and noise sources not specified in the test is assumed					
constant over subcarriers and time and shall be modelled as AWGN of appropriate pow					
for N_{oc} to be fulfilled.					
Note 2: SS-RSRP and lo levels have been derived from other parameters for information					
	s. They are not settable p				
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and					
	noise at each receiver antenna port.				
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone					

A.5.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-1 and Table A.5.5.2.4.2-2.

Table A.5.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.4.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in 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 E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config Description		Description	
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2 LTE		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note:	ote: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.5.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and two is
		1, 2	NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
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
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			AMON
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

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

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

	Parameter	Unit	Cell2		
Angle of	arrival configuration		Setup 1 according to section A.3.15.1		
$N_{oc}^{}$ Note1		dBm/15kHz ^{Note4}	-112		
$N_{oc}^{}$ Note1		dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_o	c	dB	17		
SS-RSRI	DNote2	dBm/SCS Note4	-85.97		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1: Interference from other cells and noise sources not specified in constant over subcarriers and time and shall be modelled as AV					
	for N_{oc} to be fulfille				
Note 2:		other parameters for information			
purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					
Note 4:	Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone		

A.5.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.5.2-1 and Table A.5.5.2.5.2-2.

Table A.5.5.2.5.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.5.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.6 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.5.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in 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 E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config		Description		
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2 L		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	e: The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.2.6.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and two is E-
		1, 2	UTRAN RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 1.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Paramet	ter	Unit	Cell 2			
Frequency Range			FR2			
Duplex mode	Config 1,2		TDD			
TDD configuration	Config 1,2		TDDConf.3.1			
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66			
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1			
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1			
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1			
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1			
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD			
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD			
PDCCH CORESET parameters	Confid 1.2		CCR.3.1 TDD			
OCNG Patterns			OP.1			
SMTC Configuration	Config 1,2		SMTC.1 FR2			
SSB Configuration	Config 1,2		SSB.1 FR2			
TRS configuration	Config 1,2		TRS.2.1 TDD			
TCI state	Config 1,2		TCI.State.0			
EPRE ratio of PSS to SSS	.	dB	2 2 3 3 3 3			
EPRE ratio of PBCH DMRS						
EPRE ratio of PBCH to PBC						
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS			0			
EPRE ratio of PDSCH DMR			U			
EPRE ratio of PDSCH to PD						
EPRE ratio of OCNG DMRS		1				
EPRE ratio of OCNG to OC		1				
Propagation Condition	· ·		AWGN			
Time offset to cell1 Note 2		ms	3			
Nata 4 OONO aballib	1 1 1 1 1 1		Be set ad and a secret set total transcript of a second			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

	Parameter	Unit	Cell2		
Angle of arrival configuration			According to section A.3.15.1		
$N_{oc}^{$		dBm/15kHz ^{Note4}	-112		
N_{oc} Note1		dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_{od}	2	dB	17		
SS-RSRI	ONote2	dBm/SCS Note4	-85.97		
$\hat{ extsf{E}}_{ extsf{s}}/ extsf{I}_{ ext{ot}}$		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power				
	for N_{oc} to be fulfilled	d.			
Note 2:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:					
Note 4: Note 5:	, , , , , , , , , , , , , , , , , , , ,				

A.5.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.6.2-1 and Table A.5.5.2.6.2-2.

Table A.5.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.6.2-2: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

Each interruption on E-UTRAN PCell shall not exceed 1 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.3 SCell Activation and Deactivation Delay

A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in section A.4.5.3.1.1 except the SCell is in FR2 intra-band.

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.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

Table A.5.5.3.1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell

Configuration	Description			
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE i	lote: The UE is only required to pass in one of the supported test configurations			

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell

Parameter	Unit	Value	Comment		
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in section A.3.7.2.2		

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell

ParameterNote 5	Unit	Cell 2			Cell 3		
Farameter		T1	T2	T3	T1	T2	T3

freq2

SSB ARFCN

Note 3:

Note 4:

Note 5:

antenna port.

All parameters apply for configuration 1 and 2

freq1

Duplex mode		TDD	TDD			
TDD configuration		TDDConf.3.1	TDDConf.3.1			
BWchannel	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66			
PDSCH Reference measurement channel		SR.3.1 TDD	SR.3.1 TDD			
RMSI CORESET Reference Channel		CR.3.1 TDD	CR.3.1 TDD			
RMC CORESET Reference Channel		CCR.3.1 TDD	CCR.3.1 TDD			
DL initial BWP configuration		DLBV	/P.0.1			
DL dedicated BWP configuration		DLBV	/P.1.1			
UL initial BWP configuration		ULBV	VP.0.1			
UL dedicated BWP configuration		ULBV	/P.1.1			
OCNG Patterns		OF	P.1			
SMTC configuration		SM ⁻	TC.1			
SSB configuration		SSB.1 FR2				
TCI state		TCI.State.0				
TRS configuration		TRS.2.1 TDD				
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0				
EPRE ratio of PDSCH_DMRS to SSS	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						
Propagation conditions		AW				
Note 1: OCNG shall be used such that bo		allocated and a constant total t	ransmitted 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 AV	VGN ot appropriate power for <i>N</i>	V_{oc} to be fulfilled.			

Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver

ParameterNote 6	Unit		Cell 2			Cell 3	
Parameter ""	Unit	T1	T2	T3	T1	T2	T3

Angle of arrival configuration		Setup1 according to table A.3.15.1	Setup1 according to table A.3.15.1
N _{oc} Note1	dBm/15kHz ^N	-112	-112
$N_{oc}^{ m Note1}$	dBm/SCS ^{Note}	-102.97	-102.97
\hat{E}_s/N_{oc}	dB	14	14
SS-RSRP ^{Note2}	dBm/SCS Note4	-88.97	-88.97
$\hat{E}_{\scriptscriptstyle{\mathrm{s}}}/I_{\scriptscriptstyle{\mathrm{ot}}}$	dB	14	14
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-88.80	-88.80

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 [T_{SMTC} SCell + 5ms] as defined in section 8.3.

A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in section A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2

Configuration	Description
1	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to pass in one of the supported test configurations

Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell

Parame	eter	Unit	Cell 2	Cell 3			
SSB ARFCN			T1 T2 T3	T1 T2 T3			
SSB ARFUN	Config 1 4		freq2 TDD	freq1 FDD			
Duplex mode	Config 1,4 Config 2,3,5,6	-	TDD	TDD			
			100				
	Config 1,4	_		Not Applicable			
TDD configuration	Config 2,5		TDDConf.3.1	TDDConf.1.1			
	Config 3,6			TDDConf.2.1			
	Config 1,4			10: N _{RB,c} = 52			
BWchannel	Config 2,5	MHz	100: N _{RB,c} = 66	10: N _{RB,c} = 52			
	Config 3,6]		40: N _{RB,c} = 106			
		_					
DL initial BWP	Config						
configuration	1,2,3,4,5,6		DLBV	VP.0.1			
DL dedicated BWP	Config		DI DV	VP.1.1			
configuration	1,2,3,4,5,6		DLBV	VP.1.1			
UL initial BWP	Config		LILRV	VP.0.1			
configuration	1,2,3,4,5,6		OLBV	VF.0.1			
UL dedicated BWP	Config		LILBY	VP.1.1			
configuration	1,2,3,4,5,6						
DRx Cycle		ms	Not Ap	plicable			
PDSCH Reference	Config 1,4			SR.1.1 FDD			
measurement channel	Config 2,5		SR.3.1 TDD	SR.1.1 TDD			
measurement channel	Config 3,6			SR.2.1 TDD			
RMSI CORESET	Config 1,4			CR.1.1 FDD			
Reference Channel	Config 2,5		CR.3.1 TDD	CR.1.1 TDD			
Reference Grianner	Config 3,6			CR.2.1 TDD			
RMC CORESET	Config 1,4			CCR.1.1 FDD			
Reference Channel	Config 2,5		CCR.3.1 TDD	CCR.1.1 TDD			
Reference Charmer	Config 3,6			CCR.2.1 TDD			
OCNG Patterns			OP.1				
SMTC configuration				TC.1			
TCI state			TCI.State.0	NA			
	Config 1,4			TRS.1.1 FDD			
TRS configuration	Config 2,5		TRS.2.1 TDD	TRS.1.1 TDD			
	Config 3,6			TRS.1.2 TDD			
SSB configuration	Config 1,2,4,5	_	SSB.1 FR2	SSB.1 FR1			
33B configuration	Config 3,6		00B.11102	SSB.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5	 kHz	120kHz	15kHz			
subcarrier spacing	Config 3,6	ISI IZ	30kHz				
EPRE ratio of PSS to SSS		4					
	EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS		1					
EPRE ratio of PDCCH to PDCCH DMRS		dB		0			
EPRE ratio of PDSCH DMRS to SSS		- GP		•			
EPRE ratio of PDSCH to PDSCH		1					
EPRE ratio of OCNG DMR		1					
EPRE ratio of OCNG to OC		1					
Propagation condition		-		/GN			
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_{oc} to be fulfilled.
- Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit	Cell 2		Cell 3			
Faic	ameter	Unit	T1	T2	T3	T1	T2	T3
Angle of arrival confi	Angle of arrival configuration		According to section A.3.15.1		NA			
$N_{\it oc}^{\rm Note1}$		dBm/15kHz		-112			-104	
Note1	Config 1,2,4,5	dBm/SCS		-102.97		-104		
IV oc	Config 3,6		-102.97		-101			
SS-RSRP ^{Note2}	Config 1,2,4,5	dBm/SCS	-85.97		-87			
33-N3NF ***	Config 3,6	Note3	-85.97		-84			
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB		17		17		
\hat{E}_{s}/I_{ot}		dB 17 17						
Io ^{Note2}	Config 1,2,4,5	dBm/ChBw ^N	-56.90			-58.96		
10	Config 3,6	ote4,Note6			-52.98			

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.5.5.3.2.2 Test Requirements

The test requirements defined in section A.4.5.3.1.2 shall apply to this test case.

- A.5.5.3.3 Void
- A.5.5.3.4 Void
- A.5.5.3.5 SCell Activation and deactivation of SCell in FR2

A.5.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.5.1-1 below. The test parameters are the same except those described in the following section. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.5.5.3.5.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment [100ms] after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. Immediately at beginning of T2 the transmission power of cell 3 is increased to same level as for cell 2. The UE shall be able to report valid CSI for the activated SCell at latest in slot $(m+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$ as defined in 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 $(m+1+[T_{HARQ}+3ms+T_{SMTC_MAX}+T_{SMTC_duration}])$ 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 clause 8.3, and any PCell and PSCell interruption due to the deactivation shall occur in the $(n+1+[T_{HARQ}))$ to $(n+1+[T_{HARQ}+3ms])$ as defined in 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 CSI reporting for SCell1 is discontinued.

Table A.5.5.3.5.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

Configuration	Description
1	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
5	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
6	LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.5.5.3.5.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit	Cell 2			Cell 3		
		Ullit	T1	T2	T3	T1	T2	T3
SSB ARFCN			freq1			freq2		
Duplay made Config 1,4				FDD			TDD	
Duplex mode	Config 2,3,5,6			TDD			TDD	

		•			
	Config 1,4		Not Applicable		
TDD configuration	Config 2,5		TDDConf.1.1	TDDConf.3.1	
	Config 3,6	•	TDDConf.2.1		
	Config 1,4		10: N _{RB,c} = 52		
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	Config 3,6		40: N _{RB,c} = 106		
	Config 1,4		10: N _{RB,c} = 52		
BWP BW	Config 2,5		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	Config 3,6		40: $N_{RB,c} = 106$		
DRx Cycle		ms	Not A	pplicable	
DDCCLLD (Config 1,4		SR.1.1 FDD		
PDSCH Reference	Config 2,5	1	SR.1.1 TDD	SR.3.1 TDD	
measurement channel	Config 3,6	1	SR.2.1 TDD		
51101 00 55057	Config 1,4		CR.1.1 FDD		
RMSI CORESET	Config 2,5		CR.1.1 TDD	CR.3.1 TDD	
Reference Channel	Config 3,6	1	CR.2.1 TDD		
	Config 1,4		CCR.1.1 FDD		
RMC CORESET	Config 2,5		CCR.1.1 TDD	CCR.3.1 TDD	
Reference Channel	Config 3,6		CCR.2.1 TDD		
OCNG Patterns	, <u>, , , , , , , , , , , , , , , , , , </u>)P.1	
SMTC configuration			SN	MTC.1	
TCI state			NA	TCI.State.0	
	Config 1,4		TRS.2.1 TDD		
TRS configuration	Config 2,5		TRS.1.1 TDD	TRS.2.1 TDD	
_	Config 3,6		TRS.1.2 TDD		
CCD configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR2	
SSB configuration	Config 3,6		SSB.2 FR1	55B.1 FR2	
PDSCH/PDCCH	Config 1,2,4,5	kHz	15 kHz	120 kHz	
subcarrier spacing	Config 3,6	KIIZ	30 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		-ID			
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		dB		0	
EPRE ratio of PDSCH to Pl	NSCH	-			
EPRE ratio of OCNG DMR		1			
EPRE ratio of OCNG to OC		1			
Propagation condition	` '	-	AV	WGN	
1 Topagation condition		•			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.

Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

Do	Parameter		Cell 2			Cell 3			
Pa	irameter	Unit	T1	T2	T3	T1	T2	T3	
Angle of arrival configuration			NA		According to clause A.3.15.1				
N _{oc} Note1		dBm/15kHz		[-104]			-112		
$N_{oc}^{ m Note1}$	Config 1,2,4,5 Config 3,6	dBm/SCS	[-104] [-101]		-10		-102.97		
SS-RSRPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3		[-87] [-84]		-85 (-85.97	
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB	17		17		17		
\hat{E}_{s}/I_{ot} dB [17]				17					
IoNote2	Config 1,2,4,5	dBm/ChBw		-58.96		-56.90			
10 ^{Note2}	Config 3,6	Note4,Note6	-52.98		-50.90				

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.5.5.3.5.2 Test Requirements

The test requirements defined in clause A.5.5.3.5.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [TBD*T_{SMTC} SCell+5 ms] as defined in clause 8.3.

A.5.5.4 Void

A.5.5.5 Beam Failure Detection and Link recovery procedures

A.5.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set 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, 100 MHz bandwidth				
2	LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
Note: The UE is only r	ote: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active E-UTRA PCe			Cell 1	
E-UTRA RF Channe	el Number		1	
Active PCell			Cell 2	
RF Channel Numbe			2	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration				
DL dedicated	Config 1, 2		DLBWP.1.1	
BWP configuration				
UL initial BWP	Config 1, 2		ULBWP.0.1	
configuration				
UL dedicated	Config 1, 2		ULBWP.1.1	
BWP configuration				
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET	Config 1, 2		CR. 3.1 TDD	
Reference				
Channel				
SSB Configuration	Config 1, 2		SSB.1 FR2	
SMTC	Config 1, 2		SMTC.3	
Configuration				
PDSCH/PDCCH	Config 1, 2		120 KHz	
	Corning 1, 2		120 KHZ	
subcarrier spacing				
PRACH	Config 1, 2		Table A.3.8.3.4	
Configuration	Coming 1, 2		1 4510 71.0.0.0.4	
Comigaration				
SSB index assigned	as BFD RS (g ₀)		0	
3	- (10)		-	
SSB index assigned	as CBD RS (q ₁)		1	
	T =			
TCI Configuration	Config 1, 2		TBD	
OCNG parameters			OP.1	
CP length		+	Normal	
		+ +	2x2 Low	
Configuration	Correlation Matrix and Antenna		ZXZ LUW	
DCI forma	.+		1-0	
	f Control OFDM	 	2	
	CONTROL OF DIVI		2	
symbols	an loval	CCE	8	
Aggregation	JII IEVEI	LOCE	Ö	

		I ID		
Beam	Ratio of hypothetical	dB	0	
failure	PDCCH RE energy to			
detecti	average CSI-RS RE energy			
on				
transm	Ratio of hypothetical	dB	0	
ission	PDCCH DMRS energy to			
param	average CSI-RS RE energy			
eters				
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pat			gp0	
rlmInSyr	ncOutOfSyncThreshold		absent	When the field is
				absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-Thre	esholdSSB	dBm	TBD	Threshold used for
-				$Q_{out_LR_SSB}$
powerCo	ontrolOffsetSS		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFa	ilureInstanceMaxCount		n1	see TS 38.321 [7],
				section 5.17
beamFa	ilureDetectionTimer		pbfd4	see TS 38.321 [7],
			·	section 5.17
CSI-RS	configuration for Config 1, 2		[CSI-RS.3.1 TDD]	
CSI repo				
TCI state			[TCI.State.0]	
CSI-RS	for tracking Config 1, 2		[TRS.2.1 TDD]	
SSB ind	ex assigned as RLM RS		0, 1	
T310 Tir		ms	1000	
N310			2	
T1		S	1	During this time the
				the UE shall be
				fully synchronized
				to cell 1
T2		S	2.61	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	
- ·	AH 61 -1	· · · · · · · · · · · · · · · · · · ·		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5

SNR level SSB q₀

EPRE ratio of PDCCH DMRS to SSS		dB						
EPRE rat	EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE rat	tio of PBCH to PB	CH DMRS	dB					
EPRE rat	tio of PSS to SSS		dB			0		
EPRE rat	tio of PDSCH DM	RS to SSS	dB					
EPRE rat	tio of PDSCH to F	DSCH DMRS	dB					
EPRE rat	tio of OCNG DMR	S to SSS	dB					
EPRE rat	tio of OCNG to O	CNG DMRS	dB					
SNR_SS	B of set q ₀	Config 1	dB	5	-3	-12	-12	-12
		Config 2	ub.	5	-3	-12	-12	-12
SNB SS	SNR_SSB of set q ₁		dB	-12	-12	5	5	5
01411_00	D of set q	Config 2		-12	-12	5	5	5
N _{oc} Config 1		dBm/12	TBD					
		Config 2	0 KHz	TBD				
	ion condition			TDL-A 30ns 75Hz				
Note 1:		used such that the					constant t	otal
		er spectral density			,			
Note 2:		urces for CSI repor						
Note 3:		source set configu	ration for C	Si reporting	g are assig	ned to the l	JE prior to	tne start
Nata 4.	of time period T		:					
Note 4: Note 5:		ap configuration is layer 3 filtering rela						
Note 5.	T1.	layer 3 lillering rela	aleu param	eleis ale c	oringureu p	mor to the s	start or time	penou
Note 6:		ains PDCCH for UI	Es other th	an the devi	ce under te	et as nart c	of OCNG	
Note 7:							00110.	
Note 8:								
1.1010 0.		igure A.5.5.5.1.1-1		. 5 10 401101	55 do 01111	., J	0. 11.10	
Note 9:	, , ,							
		which supports 4R						
	3000011 [A.3.0].							

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

gapOffset

SNR1	SNR1	SNR level SSB q1 rsrp-ThresholdSSB
	SNR2	Qout_LR_SSB
SNR3	D1	QOUL_LK_SSB

Test 1

Value

0

Figure A.5.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [960+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in DRX mode

A.5.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.2.1-1, A.5.5.5.2.1-2, A.5.5.5.2.1-3, A.5.5.5.2.1-4 and A.5.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set 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.

Table A.5.5.5.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Description				
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
2 LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
Note: The UE is only	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

Parameter	Unit	Value	Comment
		Test 1	
Active E-UTRA PCell		Cell 1	

E LITDA	DE Channe	Mumbor		1	<u> </u>
E-UTRA RF Channel Number Active PCell				Cell 2	
	RF Channel Number		 	2	
Duplex r		Config 1, 2		TDD	
BW _{channe}		Config 1, 2		100: N _{RB,c} = 66	
DL initia		Config 1, 2		DLBWP.0.1	
configura		Coming 1, 2		DEDWI .O.1	
	cated BWP	Config 1, 2		DLBWP.1.1	
configura		Johns 1, 2		DEBWY . T. T	
UL initia		Config 1, 2		ULBWP.0.1	
configura		cog ., _		0	
	cated BWP	Config 1, 2		ULBWP.1.1	
configura		,		_	
	nfiguration	Config 1, 2		TDDConf.3.1	
CORES		Config 1		CR. 3.1 TDD	
Referen		l com g			
Channel					
SSB Co	nfiguration	Config 1, 2		SSB.3 FR2	
	9	3 ,			
SMTC		Config 1, 2		SMTC.3	
Configur	ation				
PDSCH/		Config 1, 2		120 KHz	
subcarri	er spacing				
PRACH		05-4-0	 	T-1-1- A O O O A	
_	4:	Config 1, 2		Table A.3.8.3.4	
Configur	ation				
SSR ind	ev assigned	as BFD RS (q ₀)		0	
OOD IIId	cx assigned	as bi b ito (q ₀)		Ŭ	
SSB ind	ex assigned	as CBD RS (q ₁)		1	
	3	- (1.)			
TCI Con	figuration	Config 1, 2		TBD	
	arameters			OP.1	
CP lengt				Normal	
	on Matrix ar	nd Antenna		2x2 Low	
Configur					
Beam	DCI forma			1-0	
failure		f Control OFDM		2	
detecti	symbols				
on	Aggregation		CCE	8	
transm	Ratio of hy	/pothetical	dB	0	
ission	PDCCHR	E energy to			
param	average C	SI-RS RE energy			
eters					
		pothetical	dB	0	
		MRS energy to			
	average C	SI-RS RE energy			
					
]	DMRS pre	coder granularity		REG bundle size	
		 	6		
REG bundle size		 	6 DBV 3	A 2 2 2	
	DRX Gap pattern ID		 	DRX.3	A.3.3.3
		-Thus ab al d	 	N.A.	\//h a.a. 41 41-1-1-1
riminSyr	ncOutOfSyn	c i nresnola		absent	When the field is
					absent, the UE
					applies the value 0. (Table 8.1.1-1).
rern Thr	esholdSSB		dBm	TBD	Threshold used for
131b-1111	ooi ioiuood		GDIII	100	Q _{out_LR_SSB}
					₩our_FK_22R

powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxC	Count		n1	see TS 38.321 [7], section 5.17
beamFailureDetectionTime	er		pbfd4	see TS 38.321 [7], section 5.17
CSI-RS configuration for CSI reporting	Config 1, 2		[CSI-RS.3.1 TDD]	A.3.14.2
TCI states			[TCI.State.0]	
CSI-RS for tracking	Config 1, 2		[TRS.2.1 TDD]	
SSB index assigned as RL	MRS		0, 1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	3.37	
T3		S	2.8	
T4		S	0	
T5		S	0.61	
D1		S	0.57	
Note 1: UE-specific PD0	CCH is not trar	nsmitted a	fter T1 starts.	

Table A.5.5.5.2.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parame	Unit			Test 1			
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH D	MRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to F	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB			0		
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	IRS to SSS	dB					
EPRE ratio of OCNG to 0	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2	uБ	5	-3	-12	-12	-12
SNR SSB of set q ₁	Config 1	dB	-12	-12	5	5	5
SINK_SSB OF SEL q1	Config 2	ub	-12	-12	5	5	5
N Config 1		dBm/12	TBD				
TV _{oc}	Config 2	0 KHz			TBD		

Propagation condition			TDL-A 30ns 75Hz		
Note 1:	OCNG shall be used such that the	resources	in Cell 1 are fully allocated and a constant total		
	transmitted power spectral density is achieved for all OFDM symbols.				
Note 2:	The uplink resources for CSI repo	rting are as	ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS resource set configuration of time period T1.	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 UI	Es other th	an the device under test as part of OCNG.		
Note 7:	SNR levels correspond to the sign	al to noise	ratio over the SSS REs.		
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.				
Note 9:			E which supports 2RX on at least one band. For nds, the SNR during T3 is modified as specified in		

Table A.5.5.5.2.1-4: Void Table A.5.5.5.2.1-5: Void

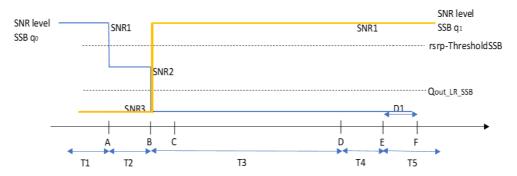


Figure A.5.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [560+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.5.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.5.5.5.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.5.3.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parame	Parameter		Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel I	Number		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing				
csi-RS-Index assigned	d as beam failure		0	
detection RS in set q ₀				
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and	Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
parameters	symbols			

Aggregation Evel Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy REG bundle size PDCCH DMRS energy to average CSI-RS RE energy DMRS PDCCH DMRS energy DMRS PDCCH DMRS					
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS energy DMRS precoder granularity REG bundle size DRX Gap pattern ID (1 passent granularity REG bundle size precoder granularity REG bundle size Si-RS in set qi sabsent When the field is absent, the UE applies the value of (1 passent) REG policy Regularity Right Size Size Size Size Size Size Size Size			CCE	8	
hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size DFF Gap pattern ID N.A. csi-RS-Index assigned as candidate beam detection RS in set q1 riminSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB					
PDCCH RE			dB	0	
energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size precoder granularity absent size precoder granularity REG bundle size precoder granularity absent size precoder granularity REG bundle size precoder granularity REG bundle size precoder granularity absent size precoder granularity REG bundle size precoder granularity absent size precoder granularity					
Average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Porcoder Granularit					
RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS Precoder granularity REG bundle size PDCM Post					
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size Precoder granularity REG bundle size OFF					
hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size PDCCH DMRS precoder granularity PDCCH D					
PDCCH DMRS energy to average CSI- RS RE energy			dB	0	
Part					
Average CSI-RS RE energy DMRS precoder granularity REG bundle size General granularity					
RS RE energy DMRS precoder granularity REG bundle size					
DMRS precoder precoder granularity REG bundle size					
Precoder granularity REG bundle Size					
Granularity REG bundle size S		_		REG bundle size	
REG bundle size					
DRX					
DRX OFF Gap pattern ID N.A.		REG bundle		6	
Sap pattern ID		size			
csi-RS-Index assigned as candidate beam detection RS in set q1 1 rImInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB dBm TBD Threshold used for Qn_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-ThresholdCSI-RS beamFailureInstanceMaxCount n1 see TS 38.321 [7], section 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], section 5.17 CSI-RS configuration for q0 and q1 CSI-RS.3.2 TDD A.3.14.2 CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 CSI-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27					
beam detection RS in set q1 absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-ThresholdSSB dBm TBD Threshold used for Qn_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-ThresholdCSI-RS beamFailureInstanceMaxCount n1 see TS 38.321 [7], section 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], section 5.17 CSI-RS configuration for q0 and q1 Config 1 CSI-RS.3.2 TDD A.3.14.2 CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 CSI-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N.310 2 T1 s 1 During this time the the UE shall be fully synchronized to cell 1 the the UE shall be fully synchronized to cell 1 T2 s 1.17 s 0 1 T3 s 0.9 1 s 0.31 T4 s 0.31 0 0 0 T5 s 0.31 0				N.A.	
Image				1	
absent, the UE applies the value					
applies the value 0. (Table 8.1.1-1).	rlmInSyncOutOfSyncT	hreshold		absent	When the field is
O. (Table 8.1.1-1). Interpretation					
Try-ThresholdSSB dBm TBD Threshold used for Qin_LR_SSB					
DeamFailureInstanceMaxCount DeamFailureInstanceMaxCount DeamFailureInstanceMaxCount DeamFailureDetectionTimer DeamFailureDetectionStart DeamFailureDetectionSt					,
DeamFailureInstanceMaxCount DeamFailureInstance DeamFailureInstan	rsrp-ThresholdSSB		dBm	TBD	
DeamFailureInstanceMaxCount DeamFailureDetectionTimer DeamFailureDetection Config 1 CSI-RS.3.2 TDD A.3.14.2					
DeamFailureInstanceMaxCount	powerControlOffsetSS			db0	_
beamFailureInstanceMaxCount n1 see TS 38.321 [7], section 5.17 beamFailureDetectionTimer pbfd4 see TS 38.321 [7], section 5.17 CSI-RS configuration for Q₀ and Q₁ Config 1 CSI-RS.3.2 TDD A.3.14.2 CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.2 TDD A.3.14.2 csi-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27					
T2 S T.17 T3 S T.17 Section 5.17 See TS 38.321 [7], section 5.17 See TS 38.321 [7], section 5.17 See TS 38.321 [7], section 5.17 S T.17 S T.17					
beamFailureDetectionTimer pbfd4 see TS 38.321 [7], section 5.17 CSI-RS configuration for Q₀ and Q₁ Config 1 CSI-RS.3.2 TDD A.3.14.2 CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 CSI-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27	beamFailureInstanceM	laxCount		n1	
CSI-RS configuration Config 1 CSI-RS.3.2 TDD A.3.14.2					
CSI-RS configuration for q ₀ and q ₁ Config 1 CSI-RS.3.2 TDD A.3.14.2 CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 csi-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27	beamFailureDetection	Timer		pbfd4	
for q ₀ and q ₁ CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 csi-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27		Ι .			
CSI-RS configuration for CSI reporting Config 1 CSI-RS.3.1 TDD A.3.14.2 csi-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27		Config 1		CSI-RS.3.2 TDD	A.3.14.2
for CSI reporting CSI-RS.3.2 TDD A.3.14.2 assigned as RLM RS ms 1000 N310 2 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27	for q ₀ and q ₁	2 "			
csi-RS-Index assigned as RLM RS Config 1 CSI-RS.3.2 TDD A.3.14.2 T310 Timer ms 1000 N310 2 1 T1 s 1 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 1.17 T3 s 0.9 1.17 T4 s 0 0 T5 s 0.31 0.27	CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
T310 Timer ms 1000 N310 2 T1 S 1 During this time the the UE shall be fully synchronized to cell 1 T2 S 1.17 T3 S 0.9 T4 S 0 T5 S 0.31 D1 S 0.27		0 " 1		001 00 0 0 TDD	10110
T310 Timer ms 1000 N310 2 T1 s 1 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 cell 1 T3 s 0.9 cell 1 T4 s 0 cell 1 T5 s 0.31 cell 2 D1 s 0.27		Config 1		CSI-RS.3.2 TDD	A.3.14.2
N310 2 T1 s 1 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 cell 1 T3 s 0.9 cell 1 T4 s 0 cell 1 T5 s 0.31 cell 2 D1 s 0.27				1000	
T1 s 1 During this time the the UE shall be fully synchronized to cell 1 T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27			ms		
the the UE shall be fully synchronized to cell 1 T2			_		Desire a della dissa
T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27	' '		s	1	
T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27					
T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27					
T2 s 1.17 T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27					·
T3 s 0.9 T4 s 0 T5 s 0.31 D1 s 0.27	TO			4 47	cell 1
T4 s 0 T5 s 0.31 D1 s 0.27					
T5 s 0.31 D1 s 0.27					
D1 s 0.27					
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					
Note 1. UE-specific PDOGE is not transmitted after 11 starts.		DDCCH is not time		r T1 starts	
	Note i. UE-specific	FDCCH IS NOT ILSU	SITILLEU AITE	ו ו זו זומונז.	

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

EPRE ra								
EPRE ra				T1	T2	Т3	T4	T5
	tio of PDCCH DMI	RS to SSS	dB					
	tio of PDCCH to P	DCCH DMRS	dB					
EPRE rat	tio of PBCH DMRS	S to SSS	dB					
EPRE ra	tio of PBCH to PB	CH DMRS	dB					
EPRE ra	tio of PSS to SSS		dB			0		
EPRE ra	tio of PDSCH DMF	RS to SSS	dB					
EPRE ra	tio of PDSCH to P	DSCH DMRS	dB					
EPRE ra	tio of OCNG DMR	S to SSS	dB					
EPRE ra	tio of OCNG to OC	CNG DMRS	dB					
SNR_CS	SI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CS	SI-RS of set q ₁	Config 1	dB	-12 -12 5 5 5				5
N		Config 1	dBm/15			TBD		
1 oc			KHz					
Note 1:							constant t	otal
Note 3:								
Nata	·							
Note 5:	The timers and I	ayer 3 filtering rela	ated param	eters are c	onfigured p	rior to the s	start of time	period
EPRE ratio of OCNG DMRS to SSS dB EPRE ratio of OCNG to OCNG DMRS dB SNR_CSI-RS of set q0 Config 1 dB 5 -3 -12 -12 -12 SNR_CSI-RS of set q1 Config 1 dB -12 -12 5 5 5 N Config 1 dBm/15 TBD							5 5Hz a constant to t of time pe JE prior to period T1.	otal riod the s

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.5.5.5.3.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

Table A.5.5.5.3.1-4: Void
Table A.5.5.5.3.1-5: Void



Figure A.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.4 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 q₀ configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q₁. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.5.4.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Nu	ımber		1	
Active PSCell	Active PSCell		Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference	Config 1		CR.3.1 TDD	A.3.1.2
Channel				

CCD Configuration	Carefin 4	1	CCD 4 EDO	A 0.40
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing				
csi-RS-Index assigned a	is beam failure		0	
detection RS in set q ₀				
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	71.0.2.1
Correlation Matrix and A	ntonno		2x2 Low	
Configuration				
Beam failure detection	DCI format		1-0	
transmission	Number of		2	
parameters	Control OFDM			
	symbols			
	Aggregation	CCE	8	
	level		-	
	Ratio of	dB	0	
	hypothetical	u D	9	
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS			
	energy to			
	average CSI-			
	RS RE energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size		o o	
DRX	0.20		DRX.3	A.3.3.3
Gap pattern ID			N.A.	71.0.0.0
csi-RS-Index assigned a	a condidata		1	
			'	
beam detection RS in se				100 d C 111
rlmlnSyncOutOfSyncThr	reshold		absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
				for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving
				rsrp-
				ThresholdCSI-RS
beamFailureInstanceMa	beamFailureInstanceMaxCount		n1	see TS 38.321
Jes andromotarioomaxoodin				[7], section 5.17
beamFailureDetectionTimer			pbfd4	see TS 38.321
			Polut	[7], section 5.17
CSI-RS configuration Config 1		<u> </u>	CSI-RS.3.2 TDD	A.3.14.2
			001-100.3.2 100	7.0.14.2
for q ₀ and q ₁	Confin d	 	001 00 0 4 700	A 0 44 0
CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
	or CSI reporting			
csi-RS-Index assigned	Config 1		CSI-RS.3.2 TDD	A.3.14.2
as RLM RS				
T310 Timer		ms	1000	
N310	<u> </u>		2	

T1	S	1	During this time the the UE shall be fully synchronized to cell 1			
T2	S	5.43				
T3	S	5.16				
T4	S	0				
T5	S	0.31				
D1	S	0.27				
Note 1: UE-specific 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		
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DN	MRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	3	dB			0		
EPRE ratio of PDSCH DN	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5
N_{oc}	Config 1	dBm/15 KHz			TBD		
Propagation condition	ı.		TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

Table A.5.5.5.4.1-4: Void

Table A.5.5.5.4.1-5: Void

Table A.5.5.5.4.1-6: Void



Figure A.5.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.5.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.5 EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements for SSB based beam failure detection and link recovery for an FR2 serving cell in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.5.5.5.5.1-1, A.5.5.5.5.1-2 and A.5.5.5.5.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.5.1-3 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.5.1-3 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2.

The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.5.5.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.5.5.5.5.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value Test 1	Comment
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Numl	her		1	
Active PSCell	501		Cell 2	
RF Channel Number			2	
Duplex mode	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration	Coming 1, 2		DEDTT	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
CORESET Reference Channel	Config 1,2		CR. 3.1 TDD	
SSB Configuration	Config 1,2		SSB.1 FR2	
SMTC Configuration	Config 1,2		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1,2		120 KHz	
SSB index assigned as BF	D RS (a ₀)		0	
SSB index assigned as CB			1	
TRS configuration			TRS.2.1 TDD	
TCI configuration			TCI.State.0	
OCNG parameters			OP.1	
AoA Setup			Setup 1	A.3.15.1
CP length			Normal	
Correlation Matrix and Ante	enna Configuration		2x2 Low	
	DCI format		1-0	
Beam failure detection	Number of Control OFDM symbols		2	
transmission parameters	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical	dB	0	
	PDCCH DMRS energy to average			
	CSI-RS RE energy DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	DRX is not in use
Gap pattern ID			N.A.	No measurement gap pattern is configured
ssb-Index			2	Number of SSB indexes used for beam failure detection
rlmInSyncOutOfSyncThres	hold		absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	[-94.5]	Threshold used for Qout_LR_SSB

powerControlOffsetSS			db0	Used for deriving rsrp-
1.				ThresholdCSI-RS
haam Failural natan aa May C		~ 2		
beamFailureInstanceMaxC	ount		n2	see TS 38.321 [7], section
				5.17
beamFailureDetectionTime	r		pbfd4	see TS 38.321 [7], section
				5.17
001 00 0 " " "	0 " 1 0		001 00 0 4 700	
CSI-RS Configuration for	Config 1, 2		CSI-RS.3.1 TDD	A.3.14.2
reporting				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the UE
				shall be fully synchronized
				to cell 1
				to cell 1
T2		S	2.6	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.5.5.5.5.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1					
			T1	T2	Т3	T4	T5	
EPRE ratio of PDCCH D	MRS to SSS	dB		•		•		
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DM	RS to SSS	dB						
EPRE ratio of PBCH to P	BCH DMRS	dB						
EPRE ratio of PSS to SS	S	dB		0				
EPRE ratio of PDSCH DI	MRS to SSS	dB						
EPRE ratio of PDSCH to	PDSCH DMRS	dB						
EPRE ratio of OCNG DM	RS to SSS	dB						
EPRE ratio of OCNG to 0	OCNG DMRS	dB						
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12	
	Config 2	иь	5	-3	-12	-12	-12	
SNR SSB of set q ₁	Config 1	dB	-12	-12	5	5	5	
SINK_SSB OF SEL Q1	Config 2	ub	-12	-12	5	5	5	
M	Config 1	Config 1 dBm/15 -104.7						
N_{oc}	Config 2	KHz			-104.7			

Propagat	ion 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	s achieve	d for all OFDM symbols.
Note 2:	The uplink resources for CSI reporting	ing are as	signed to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS resource set configura	ition for C	SI reporting are assigned to the UE prior to the start
	of time period T1.		
Note 4:			to the UE prior to the start of time period T1.
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period		
	T1.		
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.		
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.		
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3		
	respectively in figure A.5.5.5.1-1.		
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For		
	testing of a UE which supports 4RX	on all ba	nds, the SNR during T3 is modified as specified in
	section [A.3.6].		

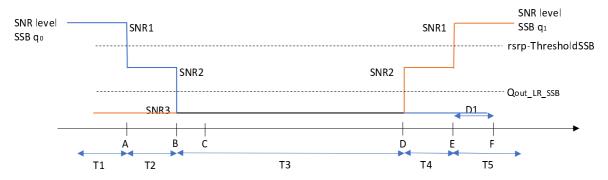


Figure A.5.5.5.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.5.5.6 Active BWP switch

A.5.5.6.1 DCI-based and Timer-based Active BWP Switch

A.5.5.6.1.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 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 downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted i. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of PSCell, respectively.

Table A.5.5.6.1.1.1-1: DL BWP switch supported test configurations

Config		Description	
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations	
Note 2:	A UE which fulfils the requirements in test case A.5.5.2.2 can skip the test cases in A.5.5.2.1.		

Table A.5.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	g G	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ם	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.5.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.1.1.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

	Parameter	Unit	Cell 2
Angle of arrival configuration			According to section
			A.3.15.1
N _{oc} Note 1		dBm/15	-112
		kHz	
Noc ^{Note 1}		dBm/SCS	-103
SS-RSF	RP Note 2	dBm/120	-85
		kHz Note3	
Ê _s /I _{ot}		dB	18
Io ^{Note2}		dBm/95.04	-56
		MHz Note4	
Note 1:	Interference from other cells and r	noise sources r	not specified in the test is
	assumed to be constant over subo		
	AWGN of appropriate power for N_{oc} to be fulfilled.		
Note 2:			
information purposes. They are not settable parameters themselves.			
Note 3: SS-RSRP minimum requirements are specified assuming independent			.
interference and noise at each receiver antenna port.			•
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the guiet zone			dBi gain at the centre of the
Note 5:	Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone.		

A.5.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

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 the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: whether E-UTRA PCell's interruption test requirement is needed or not depends on whether E-UTRA Pcell's interruption could be tested when PSCell is FR2 cell.

A.5.5.6.1.2 E-UTRAN – NR PSCell FR2 DL active BWP switch with FR2 SCell in non-DRX in synchronous EN-DC

A.5.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in section 8.6.2, 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 downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for SCell, BWP-0 in Cell 3 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in SCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j immediately after the slot wherein bwp-InactivityTimer timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in section 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

PCell(Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

SCell(Cell 3) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR SCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell and SCell during BWP switch of PSCell, respectively.

Table A.5.5.6.1.2.1-1: DL BWP switch supported test configurations

Config		Description	
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations	
Note 2:	A UE which fulfils 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		4	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	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	uБ	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.5.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3
Frequency Range		FF	R2
Duplex mode		TE)D
TDD configuration		TDDC	onf.3.1
BW _{channel}		100 MHz:	N _{RB,c} = 66
Active BWP ID		1, 2	0
Initial DL BWP Configuration		DLBWP.0.2	DLBWP.0.2
Active DL BWP-0 Configuration		NA	DLBWP.0.2
Active DL BWP-1 Configuration		DLBWP.1.3	NA
Active DL BWP-2 Configuration		DLBWP.1.1	NA
Initial UL BWP Configuration		ULBWP.0.2	ULBWP.0.2
Active UL BWP-0 Configuration		NA	ULBWP.0.2
Active UL BWP-1 Configuration		ULBWP.1.3	NA
Active UL BWP-2 Configuration		ULBWP.1.1	NA
PDSCH Reference measurement channel		SR.3.1 TDD	
RMSI CORESET parameters		CR.3.	1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD	
OCNG Patterns		OP.1	
SSB Configuration		SSB.	1 FR2
SMTC Configuration		SMTC.1	
TCI State		TRS.2.1 TDD	
TRS Configuration		TCI.State.0	
Antenna Configuration		1x2	
Propagation Condition		AWGN	
EPRE ratio of PSS to SSS	dB	0	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)]		
EPRE ratio of OCNG to OCNG DMRS (Note 1)			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3.

Table A.5.5.6.1.2.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3	
Angle of arrival configuration		According to clause A.3.15	According to clause A.3.15	
N _{oc} Note 1	dBm/15	-112	-112	
	kHz			
SS-RSRP Note 2	dBm/120	-85	-85	
	kHz ^{Note3}			
Ê _s /I _{ot}	dB	18	18	
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-56	-56	
subcarriers and time and sha	all be modelled as A	not specified in the test is assum WGN of appropriate power for N	l _{oc} to be fulfilled.	
Note 2: SS-PSPP and to levels have been derived from other parameters for information purposes. They are not				

- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone.

A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after slot $(j+T_{BWP,witchDelay}+kI)$.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PCell during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 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 the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

Editor's note: FFS value of k1 for type 1 and type 2 UE.

A.5.5.6.2 RRC-based Active BWP Switch

A.5.5.6.2.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.5.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one NR PSCell (Cell 2) as given in Table A.5.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell are specified in Table A.5.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with 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 completely receive PDSCH at the beginning of the DL slot right after PSCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PSCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in section 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including BWP switch command is sent till the time when RRC Reconfiguration Complete message is received.

Table A.5.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.5.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1			
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2			
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	

Table A.5.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

	Parameter	Unit	Cell 2			
Frequenc	cy Range		FR2			
Duplex m	node		TDD			
TDD conf	figuration		TDDConf.3.1			
BW _{channel}			100 MHz: N _{RB,c} = 66			
Active BV	VP ID		1, 2			
Initial DL	BWP Configuration		DLBWP.0.2			
Active DL	BWP-1 Configuration		DLBWP.1.3			
	BWP-2 Configuration		DLBWP.1.1			
Initial UL	BWP Configuration		ULBWP.0.2			
	BWP-1 Configuration		ULBWP.1.3			
	BWP-2 Configuration		ULBWP.1.1			
	Reference measurement channel		SR.3.1 TDD			
	RESET parameters		CR.3.1 TDD			
	d CORESET parameters		CCR.3.1 TDD			
OCNG P			OP.1			
	figuration		SSB.1 FR2			
	onfiguration		SMTC.1			
TCI State			TCI.State.0			
TRS Con	figuration		TRS.2.1 TDD			
	Configuration		1x2			
	ion Condition		AWGN			
EPRE ratio	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)					
Note 1:	o of OCNG to OCNG DMRS (Note 1) OCNG shall be used such that both	h collo ara full	v allocated and a constant			
Note 1.						
Note 2:	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					
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:						
11010 0.	information purposes. They are not settable parameters themselves.					
Note 4:	· · · · · · · · · · · · · · · · · · ·					
1,1010 -7.	is linked with ULBWP.0.2; DLBWF					
	DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of					
	TS 38.213 [3].		12 01			

Table A.5.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

P	arameter	Unit	Cell 2
Angle of arrival o	onfiguration		According to table A.3.15
NR_TDD_FR2_A			
	NR_TDD_FR2_B		
N_{oc}^{Note1}	NR_TDD_FR2_F	dDm/45kUz	110
	NR_TDD_FR2_G	dBm/15kHz	-112
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		

		NR_TDD_FR2_A			
$N_{\it oc}^{ m Note1}$		NR_TDD_FR2_B			
		NR_TDD_FR2_F	dBm/SCS	-103	
		NR_TDD_FR2_G	ubiii/SCS	-103	
		NR_TDD_FR2_T			
		NR_TDD_FR2_Y]		
		NR_TDD_FR2_A			
		NR_TDD_FR2_B]		
SS-RSRF	Note2	NR_TDD_FR2_F	dBm/SCS	-85	
35-K3KI	3.10.02	NR_TDD_FR2_G	Note3	-85	
		NR_TDD_FR2_T			
		NR_TDD_FR2_Y			
\hat{E}_{s}/I_{ot}			dB	18	
		NR_TDD_FR2_A			
		NR_TDD_FR2_B		-56	
lo ^{Note2}		NR_TDD_FR2_F	dBm/95.04		
10		NR_TDD_FR2_G	MHz Note4	-56	
		NR_TDD_FR2_T]		
		NR_TDD_FR2_Y			
Note 1:	Interference	e from other cells and	noise sources no	ot specified in the test is	
	assumed t	o be constant over subcarriers and time and shall be modelled as			
AWGN of appropriate power for			N_{oc} to be fulfille	d.	
Note 2: SS-RSRP and lo levels have bee			n derived from a	ther parameters for	
information purposes. They are n					
Note 3: SS-RSRP minimum requirements are specified assuming independent					
	interference and noise at each receiver antenna port.				
Note 4:	Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
quiet zone					

A.5.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell in the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.7 PSCell addition and release delay

A.5.5.7.1 Addition and Release Delay of NR PSCell

A.5.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 of TS 36.133 [15] for the case when the PSCell is unknown by the UE at the time of addition.

Supported test configurations are shown in A.5.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

Configuration		Description	
1		LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz	
2		LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz	
Note: The	ote: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Par	Parameter		Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold RSRP	dBm	100	Actual RSRP threshold for event B1. Needs to take absolute accuracy tolerance in section 9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
PRACH config	PRACH configuration on cell2		FR2 configuration 2	Captured in A.3.8.3.2
CQI/PMI perio configuration in	dicity and offset ndex on cell2		TBD	CQI reporting for PSCell every uplink subframe
Cell-individual offset for cells on RF channel number 1		dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on RF channel number 2		dB	0	Individual offset for cells on carrier frequency of cell2.
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2	T2		1	During this time the UE adds the PSCell.
T3	Т3		1	During this time the UE sends CSI reports for PSCell.
T4		S	1	During this time the UE releases the PSCell.

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Doromotor	Unit	Confin		Test		
Parameter	Unit	Config	T1	T2	T3	T4
E-UTRA Channel		1,2		1		
Number		· ·		-		
NR Channel Number		1,2		2		
Duplex Mode		1,2		TDD		
TDD configuration		1,2		TDDCon		
BW _{channel}	MHz	1,2	10	00: NRB,		
Initial BWP		1,2		DLBWP		
Configuration		- ,-		ULBWP		
Dedicated BWP		1,2		DLBWP		
Configuration				ULBWP		
TRS Configuration		1		TRS.2.1		
TCI State		1	C	SI-RS.Co	nfig.0	
PDSCH Reference		1,2		SR.3.1 T	מח.	
measurement channel		1,2		011.0.1		
RMSI CORESET		1,2		CR.3.1 T	ממ	
Reference Channel		.,_		011.0.1		
Dedicated CORESET		1,2		CCR.3.1	TDD	
Reference Channel		7				
OCNG Patterns		1,2		OP.1		
SSB configuration		1,2		SSB.1 F		
SMTC configuration		1,2		SMTC		
TRS Configuration		1,2		TRS.2.1	TDD	
EPRE ratio of PSS to						
SSS						
EPRE ratio of PBCH						
DMRS to SSS						
EPRE ratio of PBCH to						
PBCH DMRS EPRE ratio of PDCCH						
DMRS to SSS						
EPRE ratio of PDCCH						
to PDCCH DMRS	dB	1,2		0		
EPRE ratio of PDSCH	u D	1,2		O		
DMRS to SSS						
EPRE ratio of PDSCH						
to PDSCH						
EPRE ratio of OCNG						
DMRS to SSS(Note 1)						
EPRE ratio of OCNG	1					
to OCNG DMRS (Note						
1)						
Propagation condition		1,2		AWGI	<u> ۱</u>	

TBD

Parameter Unit Test Setup 2a according to section Angle of arrival configuration A.3.15.2.1 N_{oc} Note1 dBm/15kHzNote4 TBD N_{oc} Note1 dBm/SCSNote3 **TBD** \hat{E}_s/N_{oc} dB TBD SS-RSRPNote2 dBm/SCS Note4 TBD \hat{E}_{s}/I_{ot} dB **TBD**

Table A.5.5.7.1.1-4: OTA related test parameters

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

dBm/95.04 MHz Note4

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.5.7.1.2 Test Requirements

Io^{Note2}

The UE shall transmit the PRACH to PSCell at latest 582 ms^{Note1} into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest [20] ms into T5.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2ms$$

Where:

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 40 \text{ms}$

 $T_{search} = 8*3*20 = 480 \text{ ms}$

 $T_{\Delta} = 20 \text{ms}$

 $T_{PSCell\ DU} = 1*10+10 = 20 \text{ ms}$

A.5.5.8 Active TCI state switch delay

A.5.5.8.1 MAC-CE based active TCI state switch

A.5.5.8.1.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in section 8.10.3Supported test configurations are shown in Table A.5.5.8.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different TCI states for PSCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 2 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The is UE configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1.

The test equipment verifies that UE can be scheduled on PSCell on TCI state 0 till $n+T_{HARQ}+3$ ms $+T_{first-SSB}$. The test equipment also verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after $n+T_{HARQ}+3$ ms $+(T_{first-SSB}+T_{SSB-proc})$.

Table A.5.5.8.1.1.1-1: Supported test configurations

Config		Description		
1	L	TE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	L	TE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1: Th	Note 1: The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		I	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.5.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2				
Frequency Range		FR2				
Duplex mode		TDD				
TDD configuration		TDDConf.3.1				
BW _{channel}		100 MHz: N _{RB,c} = 66				
Initial DL BWP Configuration		DLBWP.0.2				
Dedicated DL BWP Configuration		DLBWP.1.1				
Initial UL BWP Configuration		ULBWP.0.2				
Dedicated UL BWP Configuration		ULBWP.1.1				
PDSCH Reference measurement channel		SR.3.1 TDD				
RMSI CORESET parameters		CR.3.1 TDD				
Dedicated CORESET parameters		CCR.3.1 TDD				
OCNG Patterns		OP.1				
SSB Configuration		SSB.1 FR2				
SMTC Configuration		SMTC.1				
TCI State 0		TC. State.0				
TCI State 1		TCI.State.1				
TRS Configuration		TRS.2.1 TDD				
Correlation Matrix and Antenna		1x2 Low				
Configuration						
EPRE ratio of PSS to SSS	dB	0				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS]					
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS]					
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)]					
EPRE ratio of OCNG to OCNG DMRS (Note						
1)						
Propagation Condition		AWGN				
Note 1: OCNG shall be used such that both	cells are full	Note 1: OCNG shall be used such that both cells are fully allocated and a constant				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Cell 2 Unit SSB0 SSB₁ T1 **T1** T2 **T2** Setup 3 According to section A.3.15.3 Angle of arrival configuration N_{oc}Note 1 dBm/15 kHz [-92] Noc Note 1 dBm/SCS [-83] Ês/Noc -Infinity dB TBD TBD TBD SS-RSRP Note 2 dBm/120 kHz Note3 TBD **TBD TBD** -Infinity Ês/Noc TBD dΒ **TBD TBD** -Infinity Io^{Note2} dBm/95.04 MHz Note4 **TBD** TBD TBD TBD

Table A.5.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

A.5.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARO}+3 ms+T_{first-SSB}$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms +TO_k*T_{first-SSB}

A.5.5.8.2 RRC based active TCI state switch

A.5.5.8.2.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in section 8.10.3Supported test configurations are shown in Table A.5.5.8.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 1 TCI state for PSCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state0 starts transmitting. The is UE configured to provide

periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing} + T_{first-SSB} + 2ms$.

Table A.5.5.8.2.1.1-1: Supported test configurations

Config	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.5.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	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	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	[0.2]	
T2	S	[0.2]	

Table A.5.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.0
TCI State 1		TCI.State.1
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS]	
EPRE ratio of PBCH to PBCH DMRS]	
EPRE ratio of PDCCH DMRS to SSS]	
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS]	
EPRE ratio of PDSCH to PDSCH]	
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
		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.

Unit Cell 2 SSB0 SSB₁ T1 **T1** T2 **T2** Angle of arrival Setup 3 According to section A.3.15.3 configuration N_{oc}Note 1 dBm/15 kHz [-92]Noc Note 1 dBm/SCS [-83] Ês/Noc -Infinity dB TBD TBD TBD SS-RSRP Note 2 dBm/120 kHz Note3 TBD **TBD TBD** -Infinity Ê_s/N_{oc} **TBD** TBD dΒ **TBD** -Infinity dBm/95.04 MHz Note4 Io^{Note2} TBD TBD TBD TBD

Table A.5.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as

AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for Note 2: information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent

interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

A.5.5.8.2.1.2 **Test Requirements**

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ T_{RRC_processing} + $T_{first-SSB} + 2ms$.

A.5.6 Measurement procedure

A.5.6.1 Intra-frequency Measurements

A.5.6.1.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.1.1-1.

Table A.5.6.1.1.1-1: supported test configurations

Coi	nfiguration	Description			
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	s only required to be tested in one of the supported test configurations.			

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.1.1-2, A.5.6.1.1.1-3 and A.5.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3	One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1	
A3-Offset	dB	1~4	-6	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	s	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between Cell 1 and Cell 2		1~4	3 μs	Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs	Synchronous cells
T1	S	1~4	5	
T2	s	1~4	5	

Table A.5.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration	1~4	TDDConf.3.1	TDDConf.3.1
Intial BWP	1~4	DLBWP.0.1	DLBWP.0.1
configuration		ULBWP.0.1	ULBWP.0.1
Active DL BWP	1~4	DLBWP.1.1	DLBWP.1.1
configuration			
Active UL BWP	1~4	ULBWP.1.1	ULBWP.1.1
configuration			
RLM-RS	1~4	SSB	SSB
PDSCH RMC	1~4	SR.3.1 TDD	N/A
configuration			
RMSI CORESET	1~4	CR.3.1 TDD	CR.3.1 TDD
RMC			
configuration			
Dedicated	1~4	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			
configuration			
OCNG Patterns	1~4	OP.1	OP.1
TRS configuration	1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH	1~4	TCI.State.2	N/A
TCI state			
SSB configuration	1, 2	SSB.1 FR2	SSB.1 FR2
	3, 4	SSB.2 FR2	SSB.2 FR2
Propagation	1~4	AV	VGN
Condition			

Table A.5.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Ce	ell 2	Ce	II 3
			T1	T2	T1	T2
AoA setup		1~4	S	etup 3 defii	ned in A.3.1	5.3
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD	TBD	TBD	TBD
N_{oc} Note 2	dBm/15 KHz	1~4		T	BD	
Note 2	dBm/SCS	1, 2	TBD			
1 oc		3, 4		T	BD	
SS-RSRP	dBm/SCS	1, 2	TBD	TBD	TBD	TBD
		3, 4	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	dB	1~4	TBD	TBD	TBD	TBD
Io	dBm/95.04MHz	1~4	TBD TBD		BD .	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.2 EN-DC event triggered reporting test without gap under DRX

A.5.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.2.1-1.

Table A.5.6.1.2.1-1: supported test configurations

Cor	nfiguration	Description		
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only required to be tested in one of the supported test configurations.			

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.2.1-2 ~ Table A.5.6.1.2.1-6 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Va	lue	Comment
			Test 1	Test 2	

Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3		One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1		
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	s	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.2	DRX related parameters are defined in Table A.5.6.1.2.1-4
Time offset between Cell 1 and Cell 2		1~4	3 μs		Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs		Synchronous cells
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 2	Cell 3
			T1 T2	T1 T2
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1~4	SSB	SSB
PDSCH RMC		1~4	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1~4	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1~4	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
OCNG Patterns		1~4	OP.1	OP.1
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
TCI state		1~4	CSI-RS.Config.0	N/A
SSB configuration		1, 2	SSB.1 FR2	SSB.1 FR2
		3, 4	SSB.2 FR2	SSB.2 FR2
Propagation		1~4	AV	/GN
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	S	etup 1 defii	ned in A.3.1	5.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4	-1.46	-Infinity	-1.46		
N_{oc} Note 2	dBm/15 KHz	1~4		-98				
Note 2	dBm/SCS	1, 2		-89				
oc oc		3, 4		-86				
SS-RSRP	dBm/SCS	1, 2	-85	-85	-Infinity	-85		
		3, 4	-82	-82	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4		
Io	dBm/95.04MHz	1, 2	-54.56	-52.21	-54.56	-52.21		
Note 1: The res	ources for uplink transmi	ssion are assign	ed to the UE	prior to the	start of time	period		
	ence from other cells and		•					

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.3 EN-DC event triggered reporting test with per-UE gaps under non-DRX

A.5.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.3.1-1.

Table A.5.6.1.3.1-1: supported test configurations

Conf	iguration	Description			
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	only required to be tested in one of the supported test configurations.			

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell			E-UTRAN	
		1~4	PCell (Cell 1)	
			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 length	ms	1~4	6	
Measurement gap offset	ms	1~4	39	
SMTC configuration		1~4	SMTC.1	
CSI-RS parameters		1~4	CSI-RS.3.2	
		1~4	TDD	
A3-Offset	dB	1~4	-6	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between		1~4	3 μs	Synchronous EN-DC
Cell 1 and Cell 2		1~4		
Time offset between		1~4	3 μs	Synchronous cells
Cell 2 and Cell 3		1~4		
T1	s	1~4	5	
T2	s	1~4	5	

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2	Cell 3		
			T1 T2	T1 T2		
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1		
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1		
configuration			ULBWP.0.1	ULBWP.0.1		
Active DL BWP		1~4	DLBWP.1.2	DLBWP.1.1		
configuration						
Active UL BWP		1~4	ULBWP.1.2	ULBWP.1.1		
configuration						
RLM-RS		1~4	CSI-RS	SSB		
PDSCH RMC		1~4	SR.3.1 TDD	N/A		
configuration						
RMSI CORESET		1~4	CR.3.1 TDD	CR.3.1 TDD		
RMC						
configuration						
Dedicated		1~4	CCR.3.1 TDD	CCR.3.1 TDD		
CORESET RMC						
configuration						
TRS configuration		1~4	TRS.2.1 TDD	N/A		
PDSCH/PDCCH		1~4	TCI.State.2	N/A		
TCI state						
OCNG Patterns		1~4	OP.1	OP.1		
SSB		1, 2	SSB.1 FR2 SSB.1 FR			
		3, 4	SSB.2 FR2	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	Unit Config		II 2	Ce	Cell 3	
			T1	T2	T1	T2	
AoA setup		1~4	S	etup 3 defir	ned in A.3.1	5.3	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	TBD			TBD	
N_{oc} Note 2	dBm/15 KHz	1~4		TBD			
Note 2	dBm/SCS	1, 2		TBD			
oc oc		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		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.5.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.4 EN-DC event triggered reporting test with per-UE gaps under DRX

A.5.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.4.1-1.

Configuration	Description
1	LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The LIF is	only required to be tested in one of the supported test configurations

Table A.5.6.1.4.1-1: supported test configurations

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.4.1-2 \sim 6.

During the test, Cell 2 and Cell 3 are transmitted from the direction determined according to A3.8.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for ENDC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment		
			Test 1	Test 2			
Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)				
Neighbour cell		1~4	Cell 3		Cell to be identified.		
RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3				One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE gap	S			
Measurement gap repitition periodicity	ms	1~4	40				
Measurement gap length	ms	1~4	6				
Measurement gap offset	ms	1~4	39				
SMTC configuration		1~4	SMTC.1				
CSI-RS parameters		1~4	CSI-RS.3.2	TDD			
A3-Offset	dB	1~4	-6				
CP length		1~4	Normal				
Hysteresis	dB	1~4	0				
Time To Trigger	S	1~4	0				
Filter coefficient		1~4	0		L3 filtering is not used		
DRX		1~4	DRX.1	DRX.2	DRX related parameters are defined in Table A.5.6.1.4.1-5		
Time offset between Cell 1 and Cell 2		1~4	3 μs		Synchronous EN-DC		
Time offset between Cell 2 and Cell 3		1~4	3 μs		Synchronous cells		
T1	S	1~4	5				
T2	S	1~4	10	52			

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	II 2	Cell 3	
			T1	T2	T1	T2

TDD configuration	1~4	TDDConf.3.1	TDDConf.3.1			
Intial BWP	1~4	DLBWP.0.1	DLBWP.0.1			
configuration		ULBWP.0.1	ULBWP.0.1			
Active DL BWP	1~4	DLBWP.1.2	DLBWP.1.1			
configuration						
Active UL BWP	1~4	ULBWP.1.2	ULBWP.1.1			
configuration						
RLM-RS	1~4	CSI-RS	SSB			
PDSCH RMC	1~4	SR.3.1 TDD	N/A			
configuration						
RMSI CORESET	1~4	CR.3.1 TDD	CR.3.1 TDD			
RMC						
configuration						
Dedicated	1~4	CCR.3.1 TDD	CCR.3.1 TDD			
CORESET RMC						
configuration						
TRS configuration	1~4	TRS.2.1 TDD	N/A			
PDSCH/PDCCH	1~4	TCI.State.2	N/A			
TCI state						
OCNG Patterns	1~4	OP.1	OP.1			
SSB	1, 2	SSB.1 FR2	SSB.1 FR2			
	3, 4	SSB.2 FR2	SSB.2 FR2			
Propagation	1~4	AV	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	Unit Config		ell 2	Cell 3		
			T1	T2	T1	T2	
AoA setup		1~4	S	etup 1 defi	ned in A.3.1	5.1	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1~4	4 -1.46 -Infinity -			-1.46	
N_{oc} Note 2	dBm/15 KHz	1~4		-98			
N Note 2 dBm/SCS 1, 2 -89		-89					
1 voc		3, 4		-86			
SS-RSRP	dBm/SCS	1, 2	-85	-85	-Infinity	-85	
		3, 4	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4	
Io	dBm/95.04MHz	1, 2	-54.56	-52.21	-54.56	-52.21	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\it oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.5.6.1.4.1-5: Void

Table A.5.6.1.4.1-6: Void

A.5.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.20s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2 Inter-frequency Measurements

A.5.6.2.1 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.1.1-1, A.5.6.2.1.1-2, and A.5.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.1.1-1.

Table A.5.6.2.1.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	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 on	Test 1	Test 2			
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequencies is used.		
NR RF Channel Number		Config 1,2	1,	, 2	Two FR1 NR carrier frequencies is used.		
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 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		
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15		
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,2	3µs		Synchronous cells.		
T1	S	Config 1,2	5				
T2	S	Config 1,2	5.2 for PC1; 3.5 for other PC	5.2 for PC1; 3.5 for other PC			

Table A.5.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio	T1	T1 T2		T2	
		n					
NR RF Channel Number		Config 1,2		1		2	
Duplex mode		Config 1,2	T	DD	-	ΓDD	
BW _{channel}	MHz	Config 1,2	100: N _{RB,c} = 66		100: N _{RB,c} = 66		
BWP BW	MHz	Config 1,2	100: N _{RB,c} = 66		100: N _{RB,c} = 66		
TDD configuration		Config 1,2	TDDConf.3.1		TDDConf.3.1		
Initial DL BWP		Config 1,2	DLBWP.0.1		DLBWP.0.1 N		
Initial UL BWP		Config 1,2	ULBWP.0.1		ULBWP.0.1		
Dedicated DL BWP		Config 1,2	DLBWP.1.1		DLBWP.1.1		NA

Dedicated UL BWP		Config 1,2	ULBW	VP.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	(DP.1
TRS configuration		Config 1,2	TRS.2.1 TDD		NA	
TCI configuration		Config 1,2	CSI-RS.Config.0			NA
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-
SMTC configuration defined in A.3.11		Config 1,2	SMT	ΓC.1	SN	MTC.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 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)		Config 1,2		0	0	
$N_{oc}^{$	dBm/15 kHz Note5			BD		ΓBD
N_{oc} Note2	dBm/S CS Note4	Config 1,2	TBD			ΓBD
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
	dB	Config 1,2	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc} IoNote3 Propagation Condition	dBm/95 .04 MHz Note5	Config 1,2	TBD	TBD	TBD WGN	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-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.1.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.2 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.2.1-1, A.5.6.2.2.1-2, and A.5.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:							
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel Number		Config 1,2			1		One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2		1,	, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2		ell 1 (P0 (PScell)	Cell) and	NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.1	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	s	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
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	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

	Parameter	Unit	Cell 2	Cell 3
--	-----------	------	--------	--------

		Test	T1	T2	T1	T2
		configuratio n				
NR RF Channel Number		Config 1,2	,			2
Duplex mode		Config 1,2	TD)D	-	ΓDD
BW _{channel}	MHz	Config 1,2		RB,c = 66		V _{RB,c} = 66
BWP BW	MHz	Config 1,2	100: N _F	RB,c = 66		$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBW	/P.0.1		NA
Initial UL BWP		Config 1,2	ULBW	/P.0.1		
Dedicated DL BWP		Config 1,2	DLBW			NA
Dedicated UL BWP		Config 1,2	ULBW	/P.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	()P.1
TRS configuration		Config 1,2	TRS.2.	1 TDD		NA
TCI configuration		Config 1,2	CSI-RS.	CSI-RS.Config.0		NA
PDSCH Reference measurement channel		Config 1,2	SR.3.1 TDD		-	
CORESET Reference Channel		Config 1,2	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20	120	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	()		0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N _{oc} Note2	dBm/15 kHz		TBD		-	ΓBD
	Note5					
$N_{oc}^{$	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	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: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.5.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is

provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	,						
Note 2:	target NR cell ha	is the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment				
		configurati on	Test 1	Test 2					
E-UTRA RF Channel Number		Config 1,2		1	One E-UTRAN TDD carrier frequencies is used.				
NR RF Channel Number		Config 1,2	1, 2		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				
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15				
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC				
Time offset between serving and neighbour cells		Config 1,2	3µs		Synchronous cells.				
T1	S	Config 1,2	5						
T2	S	Config 1,2	7 for PC1; 7 for PC1; 4.5 for other PC PC						

Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio	T1	T2	T1	T2	
ND DE Obsessed Newsbar		n					
NR RF Channel Number		Config 1,2	1		_	2	
Duplex mode	N 41 1-	Config 1,2	TD			DD	
BWP BW	MHz MHz	Config 1,2	100: N _R			N _{RB,c} = 66	
TDD configuration	IVITZ	Config 1,2	100: N _R		TDD:	$N_{RB,c} = 66$ Conf.3.1	
-		Config 1,2					
Initial DL BWP		Config 1,2	DLBW			NA	
Initial UL BWP		Config 1,2	DLBW	P.0.1			
Dedicated DL BWP		Config 1,2	DLBW	P.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBW	P.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	OF	P.1	C)P.1	
PDSCH Reference measurement channel		Config 1,2	SR.3.1			-	
CORESET Reference Channel		Config 1,2	CR.3.1	I TDD		-	
TRS configuration		Config 1,2	TRS.2.1 TDD		NA		
TCI configuration		Config 1,2	CSI-RS.	Config.0	NA		
SMTC configuration defined in A.3.11		Config 1,2	SMT	C.1	SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20	120		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS							
to SSS EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to		Confin 1.0		.		0	
PDCCH DMRS EPRE ratio of PDSCH DMRS		Config 1,2	С	,		0	
to SSS EPRE ratio of PDSCH to							
PDSCH EPRE ratio of OCNG DMRS							
to SSS(Note 1) EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
N _{oc} Note2	dBm/15		TBD		TBD		
	kHz Note5						
N oc Note2	dBm/S CS Note4	Config 1,2	TB	BD	٦	TBD	

SS-RSRP Note 3	dBm/S	Config 1,2	TBD	TBD	TBD	TBD	
	CS						
	Note5						
\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	Config 1,2	TBD	TBD	TBD	TBD	
	.04						
	MHz						
	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 Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the guiet zone

A.5.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.4 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.4.1-1, A.5.6.2.4.1-2, and A.5.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.4.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.4.1-1: EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:							
Note 2:	target NR cell ha	is 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 on	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2	1			One E-UTRAN TDD carrier frequencies is used.	
NR RF Channel Number		Config 1,2		1,	, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2		ell 1 (P0 (PScell)		l NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.1 FR2			As specified in clause A.3.10.2	
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
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	11 for PC1; 6.5 for othe r PC	for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	for PC1; 67 for other PC	

Table A.5.6.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio	T1	T1 T2		T2
		n				
NR RF Channel Number		Config 1,2	,	1		2
Duplex mode		Config 1,2	TD	DD	TDD	
BW _{channel}	MHz	Config 1,2	100: N _F	RB,c = 66	100: N _{RB,c} = 66	
BWP BW	MHz	Config 1,2	100: N _F	100: N _{RB,c} = 66		$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDConf.3.1		TDDConf.3.1 TDDConf.	

Initial DL BWP		Config 1,2	DLBWP.0.1		NA		
Initial UL BWP		Config 1,2	ULBWP.0.1				
Dedicated DL BWP		Config 1,2	DLBV	DLBWP.1.1 NA			
Dedicated UL BWP		Config 1,2	ULBWP.1.1 NA		NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2	Ol	OP.1 OP.1			
PDSCH Reference measurement channel		Config 1,2	SR.3.1 TDD -				
CORESET Reference Channel		Config 1,2	CR.3.1 TDD -		-		
TRS configuration		Config 1,2	TRS.2.1 TDD		NA		
TCI configuration		Config 1,2	CSI-RS.Config.0		I	NA	
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	120		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 1,2					
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)							
N _{oc} Note2	dBm/15 kHz Note5		TBD		TBD		
N_{oc} 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	
	dB	Config 1,2	TBD	TBD	TBD	TBD	
\hat{E}_s/N_{oc} IoNote3	dBm/95	Config 1,2	TBD	TBD	TBD	TBD	
	.04 MHz Note5		.55	.55	.55	, 50	
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 $N_{\it oc}$ to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They

are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at

lote 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.2.4 Test Requirements

Note 3:

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,		
	duplex mode	100 MHz bandwidth, TDD		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode		
	duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD			
	duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequencies is used.		
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.		
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3,4,5,6	39	39			
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3,6	SSB.2 FR1		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		
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15		
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.		
		Config 2,3,5,6	3µs		Synchronous cells.		
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	5.2 for PC1; 3.5 for other PC	5.2 for PC1; 3.5 for other PC			

Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Се	ell 2		Cell 3		
		configuratio	T1	T2	T1	T2		
		n				<u> </u>		
NR RF Channel Number		Config		1		2		
Dupley made		1,2,3,4,5,6	FI	DD		TDD		
Duplex mode		Config 1,4 Config	FDD TDD		TDD TDD			
		2,3,5,6	11	טט		טטו		
BW _{channel}	MHz	Config 1,4	10· Np	_{B,c} = 52	100	N _{RB,c} = 66		
D V V Chamier	1711 12	Config 2,5		B,c = 52		$N_{RB,c} = 66$		
		Config 3,6	40: Nr	B,c = 106		$N_{RB,c} = 66$		
BWP BW	MHz	Config 1,4		_{B,c} = 52		$N_{RB,c} = 66$		
		Config 2,5		$_{\rm B,c} = 52$		$N_{RB,c} = 66$		
		Config 3,6	40: N _{RE}	_{B,c} = 106		$N_{RB,c} = 66$		
TDD configuration		Config 2,5	TDDC	onf.1.1	TDD	Conf.3.1		
		Config 3,6	TDDC	onf.2.1	TDD	Conf.3.1		
Initial DL BWP		Config 1,2,3,4,5,6	DLBV	VP.0.1		NA		
Initial UL BWP		Config 1,2,3,4,5,6	ULBV	VP.0.1		NA		
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBV	VP.1.1		NA		
Dedicated UL BWP		Config	ULBWP.1.1		NA			
		1,2,3,4,5,6						
OCNG Patterns defined in		Config	OP.1			OP.1		
A.3.2.1.1 (OP.1)		1,2,3,4,5,6						
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-		
measurement channel		Config 2,5	SR.1.1 TDD		1			
		Config 3,6		1 TDD				
CORESET Reference		Config 1,4		1 FDD		-		
Channel		Config 2,5		1 TDD	1			
		Config 3,6		1 TDD				
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SMTC.2			
		Config 2,3,5,6	SM	TC.1	S	MTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	1	15		120		
		Config 3,6	3	30		120		
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS		Config 1,2,3,4,5,6	0			0		
EPRE ratio of PDCCH to PDCCH DMRS		1,2,0,7,0,0						
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								

EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz Note5		Ν	IA	T	BD
N_{oc} Note2	dBm/S CS	Config 1,2,4,5	١	IA	Т	BD
	Note4	Config 3,6	N	IA	Т Т	BD
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	NA	NA	-Infinity	TBD
	Note5	Config 3,6	NA	NA	-Infinity	TBD
Ê _s /I _{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	140160	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 Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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.5.6.2.6.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,						
	duplex mode	100 MHz bandwidth, TDD						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode						
	duplex mode							
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD							
	duplex mode							
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD							
	duplex mode							
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati on	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1			One E-UTRAN TDD carrier frequencies is used.	
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2			Two FR1 NR carrier frequencies is used.	

Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		d NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.	
Neighbour cell		Config 1,2,3,4,5,6	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39		39		
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1	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	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio	T1 T2		T1	T2	
		n					
NR RF Channel Number		Config	1		2		
		1,2,3,4,5,6					

Duplex mode		Config 1,4	FDD	TDD
		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	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 3,6	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP BW	MHz	Config 1,4	10: $N_{RB,c} = 52$	100: N _{RB,c} = 66
		Config 2,5	10: N _{RB,c} = 52	100: $N_{RB,c} = 66$
		Config 3,6	40: N _{RB,c} = 106	100: N _{RB,c} = 66
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.3.1
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1	NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1	OP.1
PDSCH Reference		Config 1,4	SR.1.1 FDD	-
measurement channel		Config 2,5	SR.1.1 TDD	
		Config 3,6	SR2.1 TDD	
CORESET Reference		Config 1,4	CR.1.1 FDD	
Channel		Config 2,5	CR.1.1 TDD	-
Chamier		Config 3,6	CR2.1 TDD	
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.2
		Config 2,3,5,6	SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config	15	120
spacing		1,2,4,5		
		Config 3,6	30	120
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH				
DMRS				
EPRE ratio of PDCCH DMRS				
to SSS				
EPRE ratio of PDCCH to		Config	0	0
PDCCH DMRS EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	J	J
to SSS				
EPRE ratio of PDSCH to				
PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
N _{oc} Note2	dBm/15 kHz		NA	TBD
	Note5			
N _{oc} Note2		Config	NA	TBD

	dBm/S CS	Config 3,6	NA		TBD	
	Note4					
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 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	AWGN			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,						
	duplex mode	100 MHz bandwidth, TDD						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode						
	duplex mode							
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD							
	duplex mode							
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD							
	duplex mode							
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequencies is used.		
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.		
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3,4,5,6	39	39			
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.1 FR2		As specified in clause A.3.10.2		
offsetMO	dB	Config 1,2,3,4,5,6	6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
a4-Threshold	dBm	Config 1,2,3,4,5,6	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		
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15		
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.		
		Config 2,3,5,6	3µs		Synchronous cells.		
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC			

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	II 2	С	ell 3
		configuratio	T1	T2	T1	T2
		n				
NR RF Channel Number		Config	1			2
Dunley made		1,2,3,4,5,6	ЕГ	ND.	TDD	
Duplex mode		Config 1,4 Config	FC TC			DD DD
		2,3,5,6	IL	טו	·	טט
BWchannel	MHz	Config 1,4	10: N _{RE}	e c = 52	100· N	√RB,c = 66
D V Chamie		Config 2,5	10: N _{RE}	3c = 52		$I_{RB,c} = 66$
		Config 3,6	40: N _{RB}			$I_{RB,c} = 66$
BWP BW	MHz	Config 1,4	10: N _{RE}		100: N	$I_{RB,c} = 66$
		Config 2,5	10: N _{RE}	_{B,c} = 52	100: N	$I_{RB,c} = 66$
		Config 3,6	40: N _{RB}	_{,c} = 106	100: N	$I_{RB,c} = 66$
OCNG Patterns defined in		Config	OF	P.1	C)P.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-
measurement channel		Config 2,5	SR.1.	1 TDD		
		Config 3,6	SR2.1	TDD]	
CORESET Reference		Config 1,4	CR.1.	1 FDD		-
Channel		Config 2,5	CR.1.			
		Config 3,6	CR2.1			
TDD configuration		Config 2,5	TDDConf.1.1		TDDConf.3.1	
		Config 3,6	TDDConf.2.1		TDDConf.3.1	
Initial DL BWP		Config	Config DLBWP.0.1		NA	
		1,2,3,4,5,6				
Initial UL BWP		Config	ULBWP.0.1			NA
		1,2,3,4,5,6				
Dedicated DL BWP		Config	DLBWP.1.1			NA
		1,2,3,4,5,6				
Dedicated UL BWP		Config	ULBW	/P.1.1	NA	
		1,2,3,4,5,6				
SMTC configuration defined in A.3.11		Config 1,4	SMT	C.2	SMTC.2	
		Config 2,3,5,6	SMT	TC.1	SN	ITC.1
PDSCH/PDCCH subcarrier	kHz	Config				
spacing	KI IZ	1,2,4,5	1	5	·	120
opaog		Config 3,6	3	0		120
EPRE ratio of PSS to SSS		3 - , -				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH		╡				
DMRS						
EPRE ratio of PDCCH DMRS to SSS		Config	0			0
EPRE ratio of PDCCH to		1,2,3,4,5,6				
PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to		╡				
PDSCH						

EPRE ratio of OCNG DMRS						
to SSS(Note 1) EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz Note5		N	IA	T	BD
N_{oc} Note2	dBm/S CS	Config 1,2,4,5	N	IA	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{E}_s/I_{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	Config 1,2,3,4,5,6	-	-	-Infinity	TBD
	MHz Note5					
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.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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.5.6.2.8.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,				
	duplex mode	100 MHz bandwidth, TDD				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode				
	duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD					
	duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD					
	duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD					
	duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD					
	duplex mode					
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config			1		One E-UTRAN TDD carrier
Number NR RF Channel		1,2,3,4,5,6		- 1	2		frequencies is used.
NK KF Channel Number		Config 1,2,3,4,5,6		1,	. 2		Two FR1 NR carrier frequencies is used.
Number		1,2,3,4,3,0					useu.
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
Neighbour cell		Config	NR ce	11 2			number 1. NR cell 3 is on NR RF channel
Neighbour ceil		1,2,3,4,5,6	INIX CE	11 3			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 on NR RF Channel 1		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
on NK KF Channel I		Config 2,5	SSB.1	ED1			As specified in clause A.3.10.1
		Coming 2,5	00D.1	1 1 1 1			As specified in clause A.S. 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 offsetMO	dB	1,2,3,4,5,6 Config	6				
OliseliviO	ав	1,2,3,4,5,6	6				
Hysteresis	dB	Config	0				
,		1,2,3,4,5,6					
a4-Threshold	dBm	Config	TBD				
CD Is a seth		1,2,3,4,5,6	Name	.1			
CP length		Config 1,2,3,4,5,6	Norma	11			
TimeToTrigger	s	Config	0				
		1,2,3,4,5,6					
Filter coefficient		Config	0				L3 filtering is not used
DDV		1,2,3,4,5,6	DDV	DDV	DDV	l DDV	As an acifical in along A O O
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2	Setu	Setu	Setu	Setu	As specified in clause A.3.15
7 to 7 to tup		001g 1,2	p 1	p 3	p 1	p 3	7 to opening in clause 7 iie. To
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 cells							The timing of Cell 3 is 3ms later than the timing of Cell 2.
00110		Config	3µs				Synchronous cells.
		2,3,5,6					
T4		0	-				
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config	11	108	11	108	
· -	-	1,2,3,4,5,6	for	for	for	for	
			PC1;	PC1;	PC1;	PC1;	
			6.5	67	6.5	67	
			for othe	for othe	for othe	for other	
			r PC	r PC	r PC	PC	
		1					l .

Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	Cell 2		ell 3
		configuratio	T1	T2	T1	T2
NR RF Channel Number		n Config	1			2
THE THE HUMBER		1,2,3,4,5,6	I			
Duplex mode		Config 1,4	FD	D		ΓDD
1		Config	TC)D		ΓDD
		2,3,5,6				
BW _{channel}	MHz	Config 1,4	10: N _{RE}	s,c = 52		N _{RB,c} = 66
		Config 2,5	10: N _{RE}		100: 1	$N_{RB,c} = 66$
		Config 3,6	40: N _{RB}			$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4	10: N _{RE}	$_{3,c} = 52$	100: 1	$N_{RB,c} = 66$
		Config 2,5	10: N _{RE}			$N_{RB,c} = 66$
OONO Detterne defined in		Config 3,6	40: N _{RB}			$N_{RB,c} = 66$
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OF	′.1)P.1
PDSCH Reference		Config 1,4	SR.1.1	FDD		-
measurement channel		Config 2,5	SR.1.1	I TDD		
		Config 3,6	SR2.1	TDD	1	
CORESET Reference		Config 1,4	CR.1.	I FDD		-
Channel		Config 2,5	CR.1.	I TDD]	
		Config 3,6	CR2.1			
TDD configuration		Config 2,5	TDDConf.1.1		TDDConf.3.1	
		Config 3,6	TDDC	onf.2.1	TDD	Conf.3.1
Initial DL BWP		Config	DLBWP.0.1			NA
		1,2,3,4,5,6				
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBW	P.1.1	NA	
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBW	/P.1.1	NA	
SMTC configuration defined in A.3.11		Config 1,4	SMT	C.2	SMTC.2	
		Config 2,3,5,6	SMTC.1		SN	MTC.1
PDSCH/PDCCH subcarrier	kHz	Config	1:	5		120
spacing		1,2,4,5 Config 3,6	3	n		120
EPRE ratio of PSS to SSS		Joining 3,0	<u>J</u>	<u> </u>		120
EPRE ratio of PBCH DMRS		-				
EPRE ratio of PBCH to PBCH		-				
DMRS EPRE ratio of PDCCH DMRS		-				
to SSS		Config	()		0
EPRE ratio of PDCCH to PDCCH DMRS		1,2,3,4,5,6	3			
EPRE ratio of PDSCH DMRS to SSS		1				
EPRE ratio of PDSCH to PDSCH						

EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
N_{oc}^{Note2}	dBm/15		N	IA	1	ΓBD
- · oc	kHz					
	Note5					
N_{oc}^{Note2}	dBm/S	Config	N	IA	1	ΓBD
- · oc	CS	1,2,4,5				
	Note4	Config 3,6	N	IA	7	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
s / Tot		1,2,3,4,5,6				
\hat{E}_s/N_{oc}	dB	Config	NA	NA	TBD	TBD
$= s / 1 \cdot oc$		1,2,3,4,5,6				
lo ^{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		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 Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

A.5.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3 L1-RSRP measurement for beam reporting

A.5.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in section A.3.15

Table A.5.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Co	onfig	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: T	Note: The UE is only required to be tested in one of the supported test configurations				

A.5.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.1.2-1 and Table A.5.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~4		SR.3.1 TDD
RMSI CORESET Reference Channel	1~4		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~4		CCR.3.1 TDD
SSB configuration	1,2		SSB.1 FR2
	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2
DRX configuration	1~4		Off
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	640
T1	1~4	S	5
T2	1~4	S	1
Propagation condition	1~4		AWGN
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH 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 1~4	dB	0	
Propagation condition	1~4		AWGN
2010			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
Parameter	Config	Onit	T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			
$N_{_{\! oc}}$ Note2	1~4	dBm/15kHz	-105			
	1,2	dBm/SSB SCS	=-96			

$N_{oc}^{ m Note2}$	3,4		-93			
\hat{E}_{s}/I_{ot}	1~4	dB	0	0	-Infinity	9
SSB RSRP Note3	1,2	dBm/SSB SCS -	-96	-96	-Infinity	-87
SSB KSKP *****	3,4	ubiii/33b 303	-93	-93	-Infinity	-84
lo Note3	1,2	dBm/95.04MHz	TBD	TBD	TBD	TBD
10 110163	3,4		TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9

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 and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 640 slots. No later than X ms plus 640 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1800 for UE supporting power class 1
- 1080 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of [0-17] dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3.2 SSB based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.5.6.3.1.

A.5.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.5.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.3.1-1.

Table A.5.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description				
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only required to be tested in one of the supported test configurations					

A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. The DCI trigger comes in slot 8 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		26
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1~2	dB	0
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.

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1			
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105			
Noc Note1	1~2	dBm/SSB SCS	-95.97			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	9		
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97		
lo Note2	1~2	dBm/95.04MHz	-63.97	-57.47		
\hat{E}_s/N_{oc}	1~2	dB	0	9		

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.5.6.3.3.3 Test Requirements

The UE shall send L1-RSRP report at slot 26 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of [0-17] dB.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.5.6.3.3.

A.5.7 Measurement Performance requirements

A.5.7.1 SS-RSRP

A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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 is the target cell.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Co	nfiguration	Description					
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note:	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	Test 1		Test 2	
raiailletei	Onit	Cell 2	Cell 3	Cell 2	Cell 3	
Physical cell ID		489	0	489	0	

SSB ARFCN		fre	<u>.a1</u>	fre	n1
Duplex mode		TDD		TDD	
TDD configuration		TDDC		TDDConf.3.1	
BW _{channel}	MHz		RB,c = 66		_{B,c} = 66
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated CORESET Reference Channel		CCR.3. 1 TDD	-	CCR.3. 1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2
SMTC configuration		SMTC.	SMTC.	SMTC.	SMTC.
Time offset with Cell 2	μs	-	3	-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS 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 DMRS Note 1	dB	0	0	0	0
\hat{E}_s/N_{oc}	dB	2.84	-0.35	Note 6	Note 6
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 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 Note 6: No noise is added in this phase of the test

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter ^{Note 6}		Unit	Test 1		Test 2	
		Onit			Cell 2	Cell 3
Angle of arrival configuration			According to section A.3.8.15.2.2		According to section A.3.15.2.2	
N Note1	NR_TDD_FR2_A		-94.03		Note 7	
TV _{oc}	NR_TDD_FR2_B	dBm/15kHz ^N			No	te 7
	NR_TDD_FR2_F				No	te 7

-			•		1		
	NR_TDD_FR2_G					te 7	
	NR_TDD_FR2_T					Note 7	
	NR_TDD_FR2_Y				Not	te 7	
	NR_TDD_FR2_A		-85		Not	te 7	
	NR_TDD_FR2_B				Not	te 7	
$N_{oc}^{}$ Note1	NR_TDD_FR2_F	dBm/SCS ^{Note}			Not	te 7	
	NR_TDD_FR2_G	3			Not	te 7	
	NR_TDD_FR2_T				Not	te 7	
	NR_TDD_FR2_Y				Not	te 7	
\hat{E}_s/N_{oc}	dB	2.85	-0.	35	N,	/A	
	NR_TDD_FR2_A			(Table	(Table	(Table	
	NR_TDD_FR2_B			B.2.2-2	B.2.2-2	B.2.2-2	
Es	NR_TDD_FR2_F	dBm/SCS ^{Note}	N/A	spheric	spheric	spheric	
	NR_TDD_FR2_G			al	al	al	
	NR_TDD_FR2_T	·		covera	covera	covera	
	NR_TDD_FR2_Y			ge +3.1dB	ge +3.1dB	ge +3.1dB	
)))	
	NR_TDD_FR2_A				(Table	(Table	
	NR_TDD_FR2_B		-82.15	-85.35	B.2.2-2	B.2.2-2	
	NR_TDD_FR2_F				spheric	spheric	
SSB RP	NR_TDD_FR2_G	dBm/SCS			al	al	
	NR_TDD_FR2_T				covera	covera	
	NR_TDD_FR2_Y				ge	ge	
					+3.1dB	+3.1dB	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$ Note 9		dB	0	-5	-5.98	-5.98	
s/ tot	T.,	QD.		-5	-0.00	-0.00	
	NR_TDD_FR2_A						
	NR_TDD_FR2_B				,	B.2.2-2	
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-50	.16	-	erical	
	NR_TDD_FR2_G	MHz Note4		-		rage	
	NR_TDD_FR2_T				+35.1dB)		
N. d. I. d.	NR_TDD_FR2_Y	<u> </u>		1.1 (1 (1. 1	
Note 1: Interference	ce from other cells and	noise sources no	ot specified	d in the tes	t is assume	ed to be	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: All parameters apply for configuration 1 and 2

Note 7: No noise is added in this phase of the test and both cells are at equal power

Note 8: SSB_RP is applied at a level 1dB above the minimum level specified in table Table B.2.2-2 for spherical coverage

Note 9: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor Σ MBs from TS 38.101-2 [19] Table 6.2.1.3-4.

Editor's Note: Addition of a high SNR phase during the testing is under consideration. The relative accuracy of cell 2 in high SNR conditions compared with cell 2 in lower SNR conditions and the relative accuracy of cell 3 in high SNR conditions compared with cell 3 in lower SNR conditions would be verified. The angle of arrival of cell 2 and

cell 3 should not change when measurements in high SNR conditions are compared with measurements in lower SNR conditions.

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. The following requirements are to be verified

The absolute accuracy of cell 2 and cell 3 shall be verified in test 1 and test 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

The relative accuracy of cell 2 compared with cell 3 shall be verified in test 1 and test 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Editor's Note: Addition of a high SNR phase during the testing is under consideration. The relative accuracy of cell 2 in high SNR conditions compared with cell 2 in lower SNR conditions and the relative accuracy of cell 3 in high SNR conditions compared with cell 3 in lower SNR conditions would be verified. The angle of arrival of cell 2 and cell 3 should not change when measurements in high SNR conditions are compared with measurements in lower SNR conditions.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement for different UE power classes

	UE power class	Test requirement Note1.2				
	1	SSB_RP-TBD-δ-≤Reported RSRP(dB)≤				
		SSB_RP+TBD+ δ dB				
	2	SSB_RP-TBD-δ-≤Reported RSRP(dB)≤				
		SSB_RP+TBD+ δ dB				
	3	SSB_RP-22.6-δ-≤Reported RSRP(dB)≤				
		SSB_RP+[20]+ δ dB				
	4	SSB_RP-TBD-δ-≤Reported RSRP(dB)≤				
		SSB_RP+TBD+ δ dB				
Note 1:	SSB_RP is the equivalent power received by configured in the test for the cell under consider	an antenna with 0dBi gain at the centre of the quiet zone eration				
Note 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 inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.1.2.1-1.

Table A.5.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.5.7.1.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Confin	l lmi4	Tes	st 1	Test 2	
	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN	1 4 4		front	frago	front	frogO
	1~4		freq1 freq2		freq1	freq2 0:
BWchannel	1~4 N _{RB,c} = 66			N _{RB,c}		
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		SSB.		SSB.	
	3,4			2 FR2		2 FR2
OCNG Patterns	1~4		OF		OF	
Initial BWP	1~4		DLBW		DLBW	
Configuration			ULBW		ULBW	
Dedicated BWP	1~4			/P.1.3	DLBWP.1.3	
configuration	4 4			/P.1.3	ULBWP.1.3	
TRS Configuration PDCCH/PDSCH TCI	1~4		TRS.2	טטו ז.	TRS.2.1 TDD	
Configuration	1~4		TCI.S	tate.2	TCI.State.2	
SMTC configuration	1~4		SMT	ΓC.1	SMTC.1	
Time offset between Cell 2 and Cell 3	1~4	μs	3	3	3	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio OF OCNG to CONGRETION OF SIGNET 1	1~4	dB	0	0	0	0
OCNG DMRS Note 1 Propagation condition	1~4	_	AW	GN	AW	GN
Antenna configuration	1~4	-		(2	1x2	

OCNG shall be used such that both cells are fully allocated and a constant total Note 1:

transmitted power spectral density is achieved for all OFDM symbols. Interference from other cells and noise sources not specified in the test is assumed to be Note 2: 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

Davameter	Confin	1124	Tes	Test 1		Test 2 NOTE 3		
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3		
N_{oc}	1~4	dBm/15 kHz	TBD		n.a.			
N_{oc}	1,2	dBm/SS	TBD		n.a.			
oc	3,4	B SCS	TBD		n.a.			
\hat{E}_s/I_{ot}	1~4	dB	TBD	TBD	n.a	l .		
SS-RSRP ^{Note1}	1,2	dBm/SC	TBD		As in Table B.2.3-2			
SS-RSRP	3,4	S	TBD		As in Table B.2.3-			
Io ^{Note1}	1~4	dBm/ 95.04M Hz	TBD		SS-RSRP+28.9			
\hat{E}_s/N_{oc}	1~4	dB	TBD	TBD	n.a	l.		

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

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.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Sections 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	bandwidth, TDD duplex mode
	bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	
Note: The U	JE is only required to be tested in one of the su	pported test configurations

A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Donomoton	Confin	11	Tes	st 1	Test 2		
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~6		freq1	freq2	freq1	freq2	
	1,4		10: N _{RB,c} = 52		10: N _{RB,c} = 52		
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	100: N _{RB.c} = 66	10: N _{RB,c} = 52	100: N _{RB.c} = 66	
	3,6		40: N _{RB,c} = 106	·	40: N _{RB,c} = 106	·	
Gap pattern ID			()	()	
•	1,4		FDD		FDD		
Duplex mode	2,5		TDD	TDD	TDD	TDD	
·	3,6		TDD		TDD		
	1,4		N/A		N/A		
TDD configuration	2,5		TDDConf. 1.1	TDDConf.	TDDConf. 1.1	TDDConf.	
, c	3,6		TDDConf. 2.1	3.1	TDDConf. 2.1	3.1	
DD00HD-(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		
RMSI CORESET	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-	
Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	
Reference Charmer	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	-	
Neierence Chainel	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-	
SSB configuration	1,4		SSB.1 FR1	SSB.1	SSB.1 FR1	SSB.1	
33B configuration	2,5		SSB.1 FR1	FR2	SSB.1 FR1	FR2	

	3,6		SSB.2		SSB.2	
	3,0		FR1		FR1	
OCNG Patterns	1~6		OF	P.1	OF	P.1
Initial BWP	1~6		DLBW	-	DLBW	-
Configuration			ULBW		ULBW	
Dedicated BWP	1~6			/P.1.3	DLBW	-
configuration				/P.1.3	ULBW	
TRS Configuration	1~6		TRS.2.	טטו 1.	TRS.2.	טטו 1.
PDCCH/PDSCH TCI Configuration	1~6		TCI.S	tate.2	TCI.S	tate.2
SMTC configuration	1~6		SMT	ΓC.1	SMT	TC.1
Time offset between	1~6	Ше	-	3	3	2
Cell 2 and Cell 3	1~0	μs	`	<u> </u>		
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	-	AW	'GN	AW	GN
Antenna configuration	1~6	-	1)	(2	1)	(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 $\frac{N_{oc}}{}$ to be fulfilled.

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2 NOTE 3	
Parameter	Config	Onit	Cell 2	Cell 3	Cell 2	Cell 3
N_{oc}	1~4	dBm/15 kHz	TB	BD	n.a	l .
N_{oc}	1,2	dBm/SS	TE	BD	n.a	l.
OC .	3,4		TBD		n.a.	
\hat{E}_{s}/I_{ot}	1~4	dB	TBD	TBD	n.a.	
SS-RSRP ^{Note1}	1,2	dBm/SC	TBD		As in Table B.2.3-2	
33-N3NF	3,4	S	TBD		As in Table B.2.3-2	
Io ^{Note1}	1~4	dBm/ 95.04M Hz	TBD		SS-RSRP+28.98	
\hat{E}_s/N_{oc}	1~4	dB	TBD	TBD	n.a.	

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in section 10.1.5.1.1.

A.5.7.2 SS-RSRQ

A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in 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, 100 MHz bandwidth, TDD duplex mode			
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	equired to pass in one of the supported test configurations			

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test	1	Test 2		
Par			Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			Freq1		Freq1		
Duplex mode			TDI		TDD		
TDD configuration			TDDCo		TDDC		
BW _{channel}		MHz	100: N _{RE}	,	100: N _R	$_{\rm B,c} = 66$	
	Initial DL BWP				VP.0.1		
BWP configuration	Dedicated DL BWP				VP.1.1		
DVVI configuration	Initial UL BWP				VP.0.1		
	Dedicated UL BWP			ULB\	WP.1.1		
TRS configuration			TRS.2.1		TRS.2.1		
Tree configuration			TDD		TDD		
TCI state			TCI.State		TCI.State		
			.0		.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
			TDD		TDD		
RMSI CORESET R	eference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	
			CCR.3.1		CCR.3.1		
Control channel RM	IC		TDD	-	TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration)		SMTC.1				
SSB configuration			SSB.1	SSB.1	SSB.1	SSB.1	
			FR2	FR2	FR2	FR2	
PDSCH/PDCCH su		kHz	120	120	120	120	
SS-RSSI-Measuren			Not Applicable				
EPRE ratio of PSS							
EPRE ratio of PBCI							
EPRE ratio of PBCI							
EPRE ratio of PDC0						0	
	CH to PDCCH_DMRS	dB	0	0	0		
EPRE ratio of PDS0		42			Ĭ	Ŭ	
	CH 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	Note5	Note5	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: No noise added in this test 2.

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

D	· · · · · · · · · · · · · · · · · · ·	l lmit	Tes	t 1	Tes	st 2
Para	meter	Unit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival confi	auration		Accord		According	to section
Angle of arrival corin			section /	A.3.15.1	A.3.	
	NR_TDD_FR2_A				Note7	
	NR_TDD_FR2_B				No	
N_{ac} Note1	NR_TDD_FR2_F	dBm/15kHz ^N	_			te7
1 oc	NR_TDD_FR2_G	ote4	-9	5		te7
	NR_TDD_FR2_L					te7
	NR_TDD_FR2_T					te7
	NR_TDD_FR2_Y					te7
	NR_TDD_FR2_A	-			No	
	NR_TDD_FR2_B	-	ì		No No	
N_{oc} Note1	NR_TDD_FR2_F	dBm/SCS ^{Note}	0	c	Note7 Note7 Note7 Note7 Note7	
00	NR_TDD_FR2_G NR_TDD_FR2_L	3	-0	-86		
	NR TDD FR2 T					
	NR_TDD_FR2_Y	-				
	NR_TDD_FR2_A	dBm/SCS	-83			-128.3+Y ₁
	NR_TDD_FR2_B			-83		-127.8+Y ₄
	NR TDD FR2 F					-125.8+Y ₄
SS-RSRP ^{Note2}	NR_TDD_FR2_G					-125.3+Y ₁
	NR_TDD_FR2_L	Note4			-113.8	-113.8
	NR_TDD_FR2_T	1			-112.1	-112.1
	NR_TDD_FR2_Y				-127.8+Y ₄ -125.8+Y ₄ -125.3+Y ₁ -1	-109.5
	NR_TDD_FR2_A					
	NR_TDD_FR2_B			-14.77		ı
	NR_TDD_FR2_F					
SS-RSRQ Note2	NR_TDD_FR2_G	dB	-14.77		-13.80	-13.80
	NR_TDD_FR2_L					
	NR_TDD_FR2_T					
	NR_TDD_FR2_Y					
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	-1.76	-1.76	0 ^{Note7}	0 Note7
	NR_TDD_FR2_A				-96.3	3+Y ₁
	NR_TDD_FR2_B]			-95.8	3+Y ₄
	NR_TDD_FR2_F	dDm/05.04		-93.8+Y ₄		
Io ^{Note2}	NR_TDD_FR2_G	dBm/95.04 MHz ^{Note4}	-5	0	-93.3	3+Y ₁
	NR_TDD_FR2_L	IVIDZ			-8	1.8
	NR_TDD_FR2_T]			-80	0.1
	NR_TDD_FR2_Y				-77	7.5

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SS-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.

Note 7: No noise is added in this test 2.

Note 8: Y₁ and Y₄ will be defined in Table B.2.1.3.1-1.

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 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.2.2.2: SS-RSRQ Inter frequency general test parameters

B	11	Test 1		Test 2	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3

Note 4:

SSB ARFCN		Freq1	freq2	freq1	Freq2
Duplex mode		TDD		TE	DD
TDD configuration		TDDConf.3.1		TDDConf.3.1	
BW _{channel}	MHz	100: N _F	RB,C = 66	100: N _{RB,c} = 66	
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	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}					
\hat{E}_s/N_{oc}	dB	-1.75	-1.75	3	-1.75

OCNG shall be used such that both cells are fully allocated and a constant total Note 1:

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.

SS-RSRQ, SS-RSRP and lo levels have been derived from other parameters for Note 3: information purposes. They are not settable parameters themselves.

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

Parameter		Unit	Test 1		Test 2	
Para			Cell 2	Cell 3	Cell 2	Cell 3
AoA setup			Set	лр 1	Setu	лр 1
	NR_TDD_FR2_A				Note 7	
	NR_TDD_FR2_B				Note 7	
N_{oc} Note1	NR_TDD_FR2_F	dBm/15kHz ^N	0.4	.03	Not	e 7
	NR_TDD_FR2_G	ote4	-94	.03	Not	e 7
	NR_TDD_FR2_T				Note 7	
	NR_TDD_FR2_Y				Note 7	
	NR_TDD_FR2_A					e 7
	NR_TDD_FR2_B				Note 7	
N_{oc}^{Note1}	NR_TDD_FR2_F	dBm/SCS ^{Note}	0.1	5.0	Note 7	
	NR_TDD_FR2_G	3	-03	5.0	Note 7	
	NR_TDD_FR2_T			Note 7		e 7
	NR_TDD_FR2_Y				Note 7	
	NR_TDD_FR2_A					
	NR_TDD_FR2_B	dPm/CCC		-86.75		
SSB_RPNote2	NR_TDD_FR2_F	dBm/SCS Note4	-86.75			
	NR_TDD_FR2_G					
	NR_TDD_FR2_T					

	NR_TDD_FR2_Y				Table B.2.2-2 RX beam peak directio n+3dB	Table B.2.2-2 RX beam peak directio n- 1.75dB
SS-RSRQ ^{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	dB	-14.75	-14.75	-10.8	-10.8
\hat{E}_{s}/I_{ot}		dB	-1.75	-1.75	3	-1.75
Io ^{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/95.04 MHz ^{Note4}	-53.8	-53.8	Table B.2.2-2 RX beam peak directio n + 32.0dB	Table B.2.2-2 RX beam peak directio n + 27.25d B
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 to be fulfilled.						

- Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone
- NR operating band groups are as defined in Section 3.5.2.
- Note 7: No noise is added in this test 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.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in section A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Coi	nfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Te	st 1	Test 2		
Parameter	Unit	Cell 2 Cell 3		Cell 2 Cell		
SSB ARFCN		Fre	eq2	Freq2		
Duplex mode			DD	TDD		
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,C = 66	
Downlink initial BWP configuration				VP.0.1		
Downlink dedicated BWP configuration			DLBV	VP.1.1		
Uplink initial BWP configuration				VP.0.1		
Uplink dedicated BWP configuration			ULBV	VP.1.1		
DRX cycle configuration	ms			plicable		
TRS configuration				.1 TDD		
TCI state				State.0		
AoA setup			etup 3 defii	ned in A.3.	15	
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
1 2001 Trainfoliation made a familiar		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1	_	
		TDD		TDD		
Dedicated RMSI CORESET Reference		CCR.3	-	CCR.3.	-	
Channel		.1 TDD	00.4	1 TDD	00.4	
OCNG Patterns		OP.1	OP.1	OP.1 TC.1	OP.1	
SMTC configuration		CCD 4			CCD 4	
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measurement	KIIZ	120	•	plicable	120	
EPRE ratio of PSS to SSS			Νοι Αρ	plicable		
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	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						
\hat{E}_s/N_{oc}	dB	4.54	2.66	N/A	N/A	
- s / - · · oc				,, .	,	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Angle of arrival configuration		Parameter	Unit	Tes	st 1	Tes	st 2
NR TDD FR2 RR		Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_C NR_TDD_FR2_C NR_TDD_FR2_T NR_TDD_FR2_C NR_T	Angle of arrival	configuration					
N_c Note1	7 trigic or arrivar		section A.3.8.X				
Na							
Na	Noted					N/A	
Na	N_{oc}^{Note1}	NR_TDD_FR2_F		-1	05	N.	/A
$N_{oc} \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		NR_TDD_FR2_G	Note4	'	00	N.	/A
NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_B NR_T		NR_TDD_FR2_T					
NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_B							
Note Note NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_G NR_TDD_FR2_T N/A NR_TDD_FR2_Y N/A NR_TDD_FR2_Y N/A NR_TDD_FR2_B N/A NR_TDD_FR2_B N/A NR_TDD_FR2_B N/A NR_TDD_FR2_B N/A NR_TDD_FR2_B N/A NR_TDD_FR2_B N/A NR_TDD_FR2_G N/A NR_TDD_FR2_G N/A NR_TDD_FR2_G N/A NR_TDD_FR2_B N/A NA N/A Note7 Note7 Note8 N Note8 N Note8 NA TDD_FR2_B Note8							
NR_TDD_FR2_G NR_TDD_FR2_B Note3 -96 N/A N/		NR_TDD_FR2_B				N.	/A
NR_TDD_FR2_T NVA NVA	N_{oc}^{Note1}	NR_TDD_FR2_F			26		
NR_TDD_FR2_Y Note7 Note8		NR_TDD_FR2_G	Note3	-`	90	N.	/A
NR_TDD_FR2_B NR_TDD_FR2_B Note7 Note8		NR_TDD_FR2_T					
$SS-RSRP^{Note2} \\ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		NR_TDD_FR2_Y				N.	/A
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		NR_TDD_FR2_A				Note7	Note7
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		NR_TDD_FR2_B				Note7	Note7
Note 2 NR_TDD_FR2_F Note 2 Note 3 Note 4 Note 5 Note 5	SC_DSDDNote2	NR_TDD_FR2_F		-91.46	-93.34	Note7	Note7
SS-SINR Note2 NR_TDD_FR2_Y	00-100101	NR_TDD_FR2_G				Note7	Note7
SS-SINR Note2 NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_D NR_TDD_FR2_D NR_TDD_FR2_D NR_TDD_FR2_D NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_E NR_TDD_FR2_B NR_TDD_FR2_T NR_TDD_FR2_T Note8 NR_TDD_FR2_T Note8 NR_TDD_FR2_T Note8 NR_TDD_FR2_T Note8 Note8 NR_TDD_FR2_T Note8 Note8 NR_TDD_FR2_T Note8 Note8 Note8 Note8 NR_TDD_FR2_T Note8 N		NR_TDD_FR2_T				Note7	Note7
$SS-SINR \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$						Note7	Note7
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_E NR_TDD_FR2_F NR_TDD_FR2_F NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_B NR_TDD_FR2_G NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_T Note8 Note9 SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with OdBi gain at the centre of the quiet zone Na observed with OdBi gain antenna at the centre of the quiet zone NR operating band groups are as defined in Section 3.5.2. SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage.		NR_TDD_FR2_B	dB	0		0	0
NR_TDD_FR2_E 0 0 0 0	SS_SINIR Note2	NR_TDD_FR2_C			-3.2	0	0
NR_TDD_FR2_F O O O	OO OIIVIK	NR_TDD_FR2_D			0.2	0	0
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							0
IoNote2 NR_TDD_FR2_B Note8 Note		NR_TDD_FR2_F				0	0
Note2 NR_TDD_FR2_F Note4 Note8 Note8 Note8 NR_TDD_FR2_T Note8 Note8 NR_TDD_FR2_T Note8 Note8 NR_TDD_FR2_T Note8 N	$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		dB	0	-3.2	0	0
NR_TDD_FR2_F NHz Note8		NR_TDD_FR2_A		1		Note8	
Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 8: lo is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-		NR_TDD_FR2_B	JD/05.04			No	te8
Note 8 Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N _{oc} to be fulfilled. Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-	L- Note?	NR_TDD_FR2_F		50.0		No	te8
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: lo is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-	IONOTEZ	NR_TDD_FR2_G		-5	9.2	No	te8
 Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 		NR_TDD_FR2_T				No	te8
constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: lo is applied at level $10\log_{10}(792)+2$ dB above the minimum level specified in Table B.2.2-		NR_TDD_FR2_Y				No	te8
constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: lo is applied at level $10\log_{10}(792)+2$ dB above the minimum level specified in Table B.2.2-	Note 1: Interf	erence from other cells and	noise sources n	ot specified	d in the tes	t is assum	ed to be
 Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 							
 Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 							
information purposes. They are not settable parameters themselves. Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-			ls have heen de	rived from	other narai	meters for	
 Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port. Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 							
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. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-						a independ	dent
 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. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 							
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. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-					the centre	of the quie	t zone
Note 6: NR operating band groups are as defined in Section 3.5.2. Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log ₁₀ (792)+2 dB above the minimum level specified in Table B.2.2-						1	-
 Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage. Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2- 							
Note 8: Io is applied at level $10\log_{10}(792)+2$ dB above the minimum level specified in Table B.2.2-							
	· ·						
			+2 dB above the	minimum	level spec	ified in Tab	le B.2.2-

A.5.7.3.1.3 Test Requirements

2 for sphereical coverage.

The SS-SINR measurement accuracy shall fulfil the requirements in section 10.1.13.1.1.

A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.5.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.2.2.2: SS-SINR Inter frequency general test parameters

Parameter	Unit	Test 1	Test 2	Test 3	
Parameter	Unit	Cell 2 Cell 3	Cell 2 Cell 3	Cell 2 Cell 3	

SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2
Duplex mode		TE	TDD		TDD		DD
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	3.1 TDDCo	
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				DLBV	/P.0.1		
Downlink dedicated BWP configuration				DLBV	/P.1.1		
Uplink initial BWP configuration				ULBV	√P.0.1		
Uplink dedicated BWP configuration				ULBV	/P.1.1		
DRX cycle configuration	ms			Not ap	olicable		
TRS configuration				TRS.2	.1 TDD		
TCI state					tate.0		
AoA setup			Se	etup 3 defii	ned in A.3.	15	
PDSCH Reference measurement channel		SR.3.1	_	SR.3.1	_	SR.3.1	_
P DOCT Reference measurement channel		TDD	_	TDD	_	TDD	-
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.
DDCCLI/DDCCLI	1.11-	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS	ID.						•
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	-0.5	-0.5	11.0	11.0	-3.0	-3.0

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A. 5.7.2.2.3: SS-SINR Inter frequency OTA related test parameters

Por	Parameter		Tes	st 1	Tes	st 2	Test 3			
Parameter		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3		
			Setu	up 1	Setup 1		Setu	лр 1		
Angle of arrival con	figuration	degrees	accord	ding to	accord	ding to	accord	ding to		
			A.3.	15.1	A.3.	15.1	A.3.	15.1		
	NR_TDD_FR2_A						Not	te7		
	NR_TDD_FR2_B					Not	te7			
N_{oc}^{Note1}	NR_TDD_FR2_F	dBm/15kHz	4	0E	405		Note7			
	NR_TDD_FR2_G	Note4 -105		UO	-105		Note7			
	NR_TDD_FR2_T						Note7			
	NR_TDD_FR2_Y						Not	te7		
	NR_TDD_FR2_A						Not	te7		
N_{oc} Note1	N_{oc} Note1 NR_TDD_FR2_B dBm/SCS NR_TDD_FR2_F Note3			\C	_	· · ·	Not	te7		
			-8	96	-6)6	Not	te7		
	NR_TDD_FR2_G								Note7	

	NR_TDD_FR2_T						No	te7
	NR_TDD_FR2_Y						No	te7
	NR_TDD_FR2_A						Note8	Note8
	NR_TDD_FR2_B						Note8	Note8
SS-RSRPNote2	NR_TDD_FR2_F	dBm/SCS	-96.5	-96.5	-85	-85	Note8	Note8
33-N3NF*****	NR_TDD_FR2_G	Note4	-90.5	-90.5	-00	-00	Note8	Note8
	NR_TDD_FR2_T						Note8	Note8
	NR_TDD_FR2_Y						Note8	Note8
	NR_TDD_FR2_A						-3.0	-3.0
	NR_TDD_FR2_B						-3.0	-3.0
SS-SINR ^{Note2}	NR_TDD_FR2_F	dB	-0.5	-0.5	11	11	-3.0	-3.0
33-SINK	NR_TDD_FR2_G			-0.5			-3.0	-3.0
	NR_TDD_FR2_T						-3.0	-3.0
	NR_TDD_FR2_Y						-3.0	-3.0
\hat{E}_{s}/I_{ot}		dB	-0.5	-0.5	11	11	-3.0	-3.0
	NR_TDD_FR2_A			•			No	te9
	NR_TDD_FR2_B						No	te9
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	6	0.0	E	E 1	No	te9
10	NR_TDD_FR2_G	MHz Note4	-0:	9.3	-5	5.4	No	te9
	NR_TDD_FR2_T						No	te9
	NR_TDD_FR2_Y						No	te9

- 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-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in Section 3.5.2.
- Note 7: N_{oc} for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. N_{oc} for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 3dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

 Note 9: Io is applied at level 10log₁₀(792)+6.54dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

A.5.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in section 10.1.15.1.1 and 10.1.15.1.2.

A.5.7.4 L1-RSRP measurement for beam reporting

A.5.7.4.1 SSB based L1-RSRP measurement

A.5.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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 Setup 1 as defined in section A.3.15.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.5.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.5.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~4		freq1	freq1
Duplex mode	1~4		TDD	TDD
TDD Configuration	1~4		TDDConf.3.1	TDDConf.3.1
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
SSB configuration	1,2		SSB.1 FR2	SSB.1 FR2
	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~4		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2	TCI.State.2
SMTC configuration	1~4		SMTC.1	SMTC.1
reportConfigType	1~4		periodic	periodic
reportQuantity	1~4		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~4		2	2
L1-RSRP reporting period	1~4		slot640	slot640
Propagation condition	1~4		AWGN	AWGN
Antenna configuration			1x2	1x2
EPRE ratio of PSS to SSS				
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 SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for $\frac{N_{oc}}{N_{oc}}$ to be fulfilled.

SS-RSRP+28.98

-2

10

Test 2 NOTE 3 Test 1 **Parameter** Config Unit SSB1 SSB1 SSB0 SSB0 Angle of arrival configuration Setup 1 according to Setup 1 according to A.3.15.1 A.3.15.1 dBm/15 N_{oc} 1~4 -100 n.a. kHz 1.2 -91 dBm/SS n.a. N_{oc} **B SCS** 3,4 -88 n.a. \hat{E}_{s}/I_{a} -2 1~4 dB 10 n.a. 1,2 dBm/SC -81 -93 As in Table B.2.4-2 SS-RSRPNote1 3,4 -90 As in Table B.2.4-2 S -78 dBm/ -51.57

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

dB Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

95.04M

Hz

RSRP minimum requirements are specified assuming independent interference and noise Note 2:

at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

1~4

1~4

A.5.7.4.1.3 **Test Requirements**

Io^{Note1}

 \hat{E}_s/N_{oc}

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in sections 10.1.20.1.

. The reported L1-RSRP value shall include the Rx antenna gain in the range of TBD.

A.5.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.5.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in 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 Setup 1 as defined in section A.3.15.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.5.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.5.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
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
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
CSI-RS	1~2		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		cri-RSRP	cri-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot640	slot640
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH to PDSCH		42	Ĭ	
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.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

			Tes	st 1	Test 2	NOTE 3
Parameter	Parameter Config Unit		CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 acc	•
			A.3.	15.1	A.3.1	5.1
N_{oc}	1~2	dBm/15 kHz	-10	00	n.a.	
N_{oc}	1~2	dBm/SS B SCS	-9	1	n.a. n.a.	
\hat{E}_{s}/I_{ot}	1~2	dB	10	-2	n.a	ı .
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2	
IoNote1	1~2	dBm/ 95.04M Hz	-59.86 SS-RSRP+2		°+28.98	
\hat{E}_s/N_{oc}	1~2	dB	-51.57 -2 n.a.			

Note 1: RSRP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise

at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.5.7.4.2.3 Test Requirements

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. The reported L1-RSRP value shall include the Rx antenna gain in the range of TBD.

A.5.8 Void

A.6 NR standalone tests with all NR cells in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations.

Table A.6.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final condition	Active cell		1, 2, 3	Cell1	
RF Chann	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
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 length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index		1, 2, 3	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell		1, 2, 3	Not configured	
T1	S	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2	S	1, 2, 3	40	T2 needs to be defined so that cell reselection reaction time is taken into account.
Т3	S	1, 2, 3	15	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1 T2 T3		T1	T2	T3	
TDD configuration		1		N/A		N/A		
		2		DDConf.1.		TDDConf.1.1		
		3	Т	DDConf.2.	1	TDDConf.2.1		
PDSCH RMC		1	(i)	R.1.1 FDD			N/A	
configuration		2		R.1.1 TDD				
		3		R.2.1 TDD				
RMSI CORESET		1	C	R.1.1 FDD)	C	R.1.1 FDI)
RMC configuration		2		R.1.1 TDD			R.1.1 TDI	
		3		R.2.1 TDD			R.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
		3	Ö	CR.2.1 TDI)	C	CR.2.1 TD	Q
OCNG Pattern		1, 2, 3		defined in A			lefined in <i>i</i>	
Initial DL BWP		1, 2, 3		DLBWP.0.1			LBWP.0.	1
configuration								
Initial UL BWP		1, 2, 3	7	JLBWP.0.1		L	JLBWP.0.	1
configuration								
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2		-140		-140		
		3		-137		-137		
Pcompensation	dB	1, 2, 3		0		0		
Qhysts	dB	1, 2, 3		0		0		
Qoffsets, n	dB	1, 2, 3		0		0		
Cell_selection_and_		1, 2, 3						
reselection_quality_				SS-RSRP			SS-RSRP	
measurement								
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
37 01		2						
		3						
N Note?	dBm/SCS	1			-98			
N_{oc} Note2		2			-98	3		
		3			-95	;		
N Note2	dBm/15 kHz	1			-98	3		
N_{oc} Note2		2						
		3						
\hat{E}_s/N_{oc}	dB	1	16	13	16	-infinity	16	13
-s/oc		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
lo	dBm/9.36 MHz	1	-53.94	-52.21	-52.21		in Cell 1 c	
	dBm/9.36 MHz	2	-53.94 -52.21 -52.21				-	
	dBm/38.16 MHz	3	-47.85 -46.12 -46.12					
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3	-	N50			N50	
Propagation		1, 2, 3			AWG	SN		
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.6.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, 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; 1280ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s for the cell re-selection delay to an already detected cell in the test case, which we allow 8 s.

A.6.1.1.2 Cell reselection to FR1 inter-frequency NR case

A.6.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.6.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.2.2-1, A.6.1.1.2.2-2 and A.6.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.6.1.1.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD			
	duplex mode	duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode	duplex mode			
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case

	Parameter	Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3	Cell2	The UE camps on cell 2 in the initial
condition					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	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2
condition					with higher priority during T3
RF Channe			1, 2, 3	1, 2	
Time offse	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	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	
55%	1 4		4.0.0	pattern 1	T
DRX cycle		S	1, 2, 3	1.28	The value shall be used for all cells in the test.
	onfiguration 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	15	T1 needs to be defined so that cell reselection reaction time is taken into account.
T2		S	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2, 3	75	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1				Cell 2		
		configuration	T1	T2	T3	T1	T2	Т3	
TDD configuration		1		N/A		N/A			
		2	Т	TDDConf.1.1 TDDCor			DDConf.1.	1	
		3	Т	DDConf.2.1		TDDConf.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	CR.1.1 FDD			CR.1.1 FDD CR.1.		R.1.1 FDD)
RMC configuration		2	CR.1.1 TDD CR.1.1 TDD)		
		3	C	R.2.1 TDD		CR.2.1 TDD)	

Dedicated CORESET		1	C	CR.1.1 FDI		С	CR.1.1 FD	D .
RMC configuration		2	CCR.1.1 TDD CCR.1.1 TI					
J		3	CCR.2.1 TDD CCR.2.1 TDD					
OCNG Pattern		1, 2, 3		defined in A			defined in A	
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.	
configuration		., _, -				-		
Initial UL BWP		1, 2, 3	l	JLBWP.0.1		Į	JLBWP.0.	1
configuration		, , -						
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2		-140			-140	
		3		-137			-137	
Pcompensation	dB	1, 2, 3		0			0	
Qhysts	dB	1, 2, 3		0			0	
Qoffset _{s, n}	dB			0			0	
Cell_selection_and_		1, 2, 3 1, 2, 3					-	
reselection_quality_		., _, -		SS-RSRP			SS-RSRP	
measurement								
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	14	14	14	-4	-infinity	12
S / Tot		2	1					
		3	1					
λ7	dBm/SCS	1	-98					
N_{oc} Note2		2	-98					
		3			-95			
N 7	dBm/15 kHz	1			-98			
N_{oc} Note2		2						
		3						
\hat{E}_s/N_{oc}	dB	1	14	14	14	-4	-infinity	12
L_s/V_{oc}		2	1					
		3						
SS-RSRP Note3	dBm/SCS	<u></u>	-84	-84	-84	-102	-infinity	-86
	u.z, 000	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	1	48			48	
Thresh _{serving, low}	dB	1, 2, 3		44			44	
Thresh _{x, low}	dB	1 2 3		50			50	
Propagation	שט	1, 2, 3 1, 2, 3	 	50	AWG	N	50	
Condition		1, 2, 3			AVVG	14		
	be used such that both	colle are fully all	ocated and a	constant t	otal transm	ittad nawa	r enectral (doncity

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 $\frac{N_{oc}}{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_}$ $T_{higher_priority_search} + T_{evaluate, NR_}$ $T_{higher_priority_search} + T_{evaluate, NR_}$

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; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	·
Note: The L	JE is only required to be tested in one of the supp	ported test configurations.

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and during 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.
	rring 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 [23]
T1		S	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.
T2		Ø	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
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				
		2, 5	Т	DDConf.1	.1		
		3, 6	Т	DDConf.2	2.1		
PDSCH parameters		1, 4	9	SR.1.1 FD	D		
		2, 5	9	SR.1.1 TD	D		
		3, 6	9	SR.2.1 TD	D		
RMSI CORESET		1, 4		SR.2.1 TDD CR.1.1 FDD CR.1.1 TDD CR.2.1 TDD			
parameters		2, 5		CR.1.1 FDD CR.1.1 TDD CR.2.1 TDD			
		3, 6		CR.1.1 FDD CR.1.1 TDD CR.2.1 TDD CCR.1.1 FDD			
Dedicated CORESET		1, 4	С	CR.2.1 TDD CCR.1.1 FDD			
parameters		2, 5	С	CR.1.1 TI	DD		
		3, 6	С	CR.2.1 TI	DD		
SSB parameters		1, 4	•	SSB.1 FR	1		
		2, 5	;	SSB.1 FR	1		
		3, 6	SSB.2 FR1				
NR SMTC parameters		1, 4	SN	/ITC patte	rn 2		
		2, 5	SN	/ITC patte	rn 1		
		3, 6	SN	/ITC patte	rn 1		

OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 d	lefined in .	A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6		DLBWP.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		
M	dBm/SCS	1, 4		-98		
N_{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	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	14	14	14	
s / Ot		2, 5				
		3, 6				
\hat{E}_s/N_{oc}	dB	1, 4	14	14	14	
SI OC		2, 5				
		3, 6				
lo	dBm/9.36 MHz	1, 4	-55.88	-55.88	-55.88	
	dBm/9.36 MHz	2, 5	-55.88	-55.88	-55.88	
	dBm/38.16 MHz	3, 6	-49.79	-49.79	-49.79	
Treselection	S	1, 2, 3, 4, 5, 6		0		
Snonintrasearch	dB	1, 2, 3, 4, 5, 6		50		
Thresh _{x, high (Note 2)}	dB	1, 2, 3, 4, 5, 6		48		
Thresh _{serving, low}	dB	1, 2, 3, 4, 5, 6		44		
Thresh _{x, low}	dB	1, 2, 3, 4, 5, 6		50		
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN		

Note 2: This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit		Cell 2			
		T1	T2	T3		
E-UTRA RF Channel			1			
number						
BW _{channel}	MHz		10			
OCNG Patterns defined in		OP.	2 TDD for	test		
TS 36.133 [15] clause A.3.2		configuration 1, 2, 3;				
		OP.	2 FDD for	test		
		confi	guration 4	, 5, 6		
PBCH_RA	dB					
PBCH_RB	dB					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB					
PHICH_RA	dB		_			
PHICH_RB	dB		0			
PDCCH_RA	dB					
PDCCH_RB	dB					
PDSCH_RA	dB]				
PDSCH_RB	dB					
OCNG_RA ^{Note 1}	dB					
OCNG_RB ^{Note 1}	dB					

Qrxlevmin	dBm		-140		
N_{oc}	dBm/15 kHz		-98		
RSRP	dBm/15 KHz	-infinity	-86	-102	
\hat{E}_{s}/I_{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 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 *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

 $T_{higher_priority_search}$ See clause 4.2.2.7

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of three successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
Note: The U	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter	Unit	Test	Value	Comment		
			configuration				
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 1 in the initial		
condition					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	Barring Information -		ss Barring Information - 1, 2, 3, 4, 5, 6		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	I configuration index		1, 2, 3, 4, 5, 6	87	The detailed configuration is specified in		
	S .				TS 38.211 clause 6.3.3.2		
E-UTRAN	PRACH configuration		1, 2, 3, 4, 5, 6	4	As specified in table 5.7.1-2 in		
index					TS 36.211 [23]		
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

T1	Parameter	Unit	Test configuration	Cell 1		
PDSCH RMC configuration			J			
PDSCH RMC configuration	TDD configuration		1, 4	N/A	A	
PDSCH RMC configuration			2, 5	TDDCo	nf.1.1	
RMSI CORESET RMC			3, 6	TDDCo	nf.2.1	
SMSI CORESET RMC	PDSCH RMC configuration		1, 4	SR.1.1	FDD	
RMSI CORESET RMC configuration 1, 4 CR.1.1 FDD Dedicated CORESET RMC configuration 1, 4 CCR.1.1 FDD SSB configuration 2, 5 CCR.1.1 FDD SSB configuration 1, 4 CCR.1.1 FDD SSB configuration 1, 4 SSB.1 FR1 SSB configuration 1, 4 SSB.1 FR1 SMTC configuration 1, 4 SMTC pattern 1 SMTC configuration 1, 4 SMTC pattern 1 OCNG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 DLBWP.0 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 DLBWP.0 Initial UL BWP configuration 1, 2, 3, 4, 5, 6 SSB Qrxlevmin dBm/SCS 1, 2, 3, 4, 5, 6 SSB Qrxlevmin dBm/SCS 1, 4 -98 3, 6 -137 -98 SS-RSRP dBm/SCS 1, 4 -98 \$\hat{2}, \frac{1}{2}, \frac{1}{2} -86 \$\hat{2}, \frac{1}{2}, \frac{1}{2} -86 \$\hat{2}, \frac{1}{2} <			2, 5	SR.1.1	TDD	
configuration 2, 5 CR.1.1 TDD Dedicated CORESET RMC configuration 1, 4 CCR.1.1 FDD configuration 2, 5 CCR.1.1 TDD SSB configuration 1, 4 SSB.1 FR1 SSB configuration 1, 4 SSB.1 FR1 SMTC configuration 1, 4 SMTC pattern CONG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial UL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0 Initial UL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.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 Noc dBm/SCS 1, 2, 4, 5 -98 SS-RSRP dBm/SCS 1, 4 -98 \$\bar{2}, f_{\text{oc}}\$ -99 -83 \$\bar{2}, f_{\text{oc}}\$ -99 -83 \$\bar{2}, f_{\text{oc}}\$ -102 -86			3, 6	SR.2.1	TDD	
Section Sect	RMSI CORESET RMC		1, 4	CR.1.1	FDD	
Dedicated CORESET RMC configuration 1, 4 CCR.1.1 FDD configuration 2, 5 CCR.1.1 TDD SSB configuration 1, 4 SSB.1 FR1 2, 5 SSB.1 FR1 SSB.2 FR1 SMTC configuration 1, 4 SMTC pattern 2 2, 5 SMTC pattern 1 3, 6 SMTC pattern 1 OCNG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 DLBWP.0 RLM-RS 1, 2, 3, 4, 5, 6 ULBWP.0 Qrxlevmin dBm/SCS 1, 2, 3, 4, 5, 6 ULBWP.0 Noc dBm/SCS 1, 2, 3, 4, 5, 6 ULBWP.0 Noc 1, 2, 3, 4, 5, 6 ULBWP.0 SSB Noc 1, 2, 3, 4, 5, 6 ULBWP.0 SSB Noc 1, 2, 3, 4, 5, 6 ULBWP.0 SSB Noc 1, 2, 3, 4, 5, 6 ULBWP.0 SSB SS-RSRP dBm/SCS 1, 4 -98 -98 SS-RSRP dB 1, 4 -102 -86 \$\bar{e}_s/\bar{r}	configuration		2, 5	CR.1.1	TDD	
configuration 2, 5 CCR.1.1 TDD SSB configuration 1, 1, 4 SSB.1 FR1 2, 5 SSB.1 FR1 3, 6 SSB.2 FR1 SMTC configuration 1, 4 SMTC pattern 2 2, 5 SMTC pattern 1 3, 6 SMTC pattern 1 OCNG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0 Initial DL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0 RLM-RS 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 -93 -93 -98 3, 6 -95 -98 -96 3, 6 -95 -98 -99 -83 Ê _x /V _{ac} d			3, 6	CR.2.1	TDD	
SSB configuration			1, 4	CCR.1.1	1 FDD	
SSB configuration	configuration		2, 5	CCR.1.1	1 TDD	
SMTC configuration			3, 6	CCR.2.	1 TDD	
SMTC configuration	SSB configuration		1, 4	SSB.1	FR1	
SMTC configuration 1, 4 SMTC pattern 2 Q. 5 SMTC pattern 1 3, 6 SMTC pattern 1 OCNG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 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 ULBWP.0 Grxlevmin dBm/SCS 1, 2, 3, 4, 5, 6 SSB Grxlevmin dBm/SCS 1, 4 -98 2, 5 -98 -98 Noc dBm/SCS 1, 4 -98 8 2, 5 -98 3, 6 -95 -98 Noc dBm/SCS 1, 4 -102 -86 8 2, 5 -102 -86 9 -98 -36 -99 -83 1, 4 -102 -86 -98 -98 -98 1, 2, 3, 4, 5, 6 -99 -83 -99 -83 -99 -83			2, 5	SSB.1	FR1	
CONG Pattern 1			3, 6	SSB.2	FR1	
OCNG Pattern 3, 6 SMTC pattern 1 Initial DL BWP configuration Initial UL BWP configuration 1, 2, 3, 4, 5, 6 DLBWP.0 Initial UL BWP configuration 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 -137 Noc dBm/SCS 1, 4 -98 2, 5 -98 -98 3, 6 -95 -98 Noc dBm/15 kHz 1, 2, 3, 4, 5, 6 -98 SS-RSRP dBm/SCS 1, 4 -102 -86 2, 5 -102 -86 -99 -83 Ê _s /I _{ot} dB 1, 4 -4 12 Ê _s /N _{oc} dB 1, 4 -4 12 Ê _s /N _{oc} dB 1, 4 -4 12 Ê _s /N _{oc} dB 1, 4 -4 12 Ê _s /N _{oc} dB 1, 4 -68.60 -57.78	SMTC configuration		1, 4	SMTC pa	attern 2	
OCNG Pattern 1, 2, 3, 4, 5, 6 OP.1 defined in A.3.2.1 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 -140 -98 Moc 4Bm/SCS 1, 4 -98 2, 5 -98 -95 Noc 4Bm/SCS 1, 4 -98 SS-RSRP 4Bm/SCS 1, 4 -102 -86 3, 6 -99 -83 Ê _s /I _{ot} 4Bm/SCS 1, 4 -102 -86 3, 6 -99 -83 Ê _s /I _{ot} 4Bm/SCS 1, 4 -4 12 2, 5 -102 -86 -99 -83 Ê _s /I _{ot} 4Bm/SCS 1, 4 -4 12 Es/N _{oc} dB 1, 4 -4 12 2, 5 3, 6 -99 -83	-		2, 5	SMTC pa	attern 1	
Initial DL BWP configuration			3, 6	SMTC pa	attern 1	
Initial UL BWP configuration 1, 2, 3, 4, 5, 6 SSB	OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined	d in A.3.2.1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBW	/P.0	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Initial UL BWP configuration		1, 2, 3, 4, 5, 6			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	RLM-RS		1, 2, 3, 4, 5, 6	SSB		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Qrxlevmin	dBm/SCS		-140		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			3, 6	-137		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	M	dBm/SCS	1, 4	-98	3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	IV _{oc}		2, 5	-98	3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			3, 6	-98	5	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	OC					
	SS-RSRP	dBm/SCS	1, 4	-102	-86	
			2, 5	-102	-86	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				-99	-83	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\hat{\mathbf{E}}_{s}/\mathbf{I}_{or}$	dB	,	-4	12	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	37 00					
Column						
Column	\hat{E}_{s}/N_{ac}	dB	1, 4	-4	12	
Io dBm/9.36 MHz 1, 4 -68.60 -57.78 dBm/9.36 MHz 2, 5 -68.60 -57.78 dBm/38.16 MHz 3, 6 -62.50 -51.69 Treselection S 1, 2, 3, 4, 5, 6 0 Sononintrasearch 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	37 00					
dBm/9.36 MHz 2, 5 -68.60 -57.78 dBm/38.16 MHz 3, 6 -62.50 -51.69 Treselection S 1, 2, 3, 4, 5, 6 0 Snonintrasearch dB 1, 2, 3, 4, 5, 6 50 Thresh _{x, high (Note 2)} dB 1, 2, 3, 4, 5, 6 48 Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50			3, 6			
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	lo			-68.60	-57.78	
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				-68.60	-57.78	
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		dBm/38.16 MHz	3, 6	-62.50	-51.69	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Treselection	S	1, 2, 3, 4, 5, 6	0		
Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50	Snonintrasearch	dB		50)	
Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50	Thresh _{x, high (Note 2)}	dB	1, 2, 3, 4, 5, 6	48	3	
Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50	Thresh _{serving, low}	dB	1, 2, 3, 4, 5, 6	44	ļ <u> </u>	
		dB		50)	
1, 2, 0, 1, 0, 0	Propagation Condition		1, 2, 3, 4, 5, 6	AWC	3N	

Note 2: This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Ce	ell 2
		T1	T2
			T3
E-UTRA RF Channel			1
number BW _{channel}	MHz		10
OCNG Patterns defined in	IVITIZ		DD for test
TS 36.133 [15] clause A.3.2			tion 1, 2, 3;
10 00.100 [10] 014430 74.0.2			D for test
		-	tion 4, 5, 6
PBCH_RA	dB	J	, ,
PBCH_RB	dB		
PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		•
PHICH_RB	dB		0
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA ^{Note 1}	dB		
OCNG_RBNote 1	dB		
Qrxlevmin	dBm		40
N_{oc}	dBm/15 kHz	-	98
RSRP	dBm/15 KHz	-84	-84
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	14	14
\hat{E}_s/N_{oc}	dB	14	14
TreselectionEUTRAN	S		0
Snonintrasearch	dB	Not	sent
Thresh _x , high (Note 2)	dB	4	18
Thresh _{serving, low}	dB		14
Thresh _{x, low}	dB	50	
Propagation Condition			/GN
Note 1: OCNG shall be use			
and a constant tota		ver spectral de	ensity is
achieved for all OFI		المراجعة الماسية	a alicada al Ser 🖵
Note 2: This refers to the va			
UTRA system infor	nation, and is a	unesnoia for i	ine NR target

cell

A.6.1.2.2.3 **Test Requirements**

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: $T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.2 SA: RRC_INACTIVE state mobility

A.6.3 RRC_CONNECTED state mobility

A.6.3.1 Handover

A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell

A.6.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.1.2-2, and A.6.3.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.6.3.1.1.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description					
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only 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	Parameter		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 configuration index			FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-
			_	3 in TS 38.211 [6]
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

Parame	eter	Unit	T1	Cell 1	T3	T1	Cell 2	Т3
NR RF Channel Number			• • •		- 13	•••		13
	Config 1			•	FD	D D		
Duplex mode	Config 2,3							
	Config 1				Not App	licable		
TDD configuration	Config 2	Mig 1						
	Config 3							
	Config 1				10: N _{RE}	$_{s,c} = 52$		
BW _{channel}	Config 2	MHz						
	Config 3							
	Config 1				10: N _{RE}	$_{3,c} = 52$		
BWP BW	Config 2	MHz						
	Config 3				40: N _{RB} ,	c = 106		
DRx Cycle		ms						
DDCCII Deference	Config 1				SR.1.1	FDD		
PDSCH Reference measurement channel	Config 2				SR.1.1	TDD		
measurement channel	Config 3				SR2.1	TDD		
CORECET Reference	Config 1				CR.1.1	FDD		
CORESET Reference Channel	Config 2				CR.1.1	TDD		
Channel	Config 3				CR2.1	TDD		
	Config 1				TRS.1.	1 FDD		
TRS configuration	Config 2				TRS.1.	1 TDD		
	Config 3							
OCNG Patterns			OCNG pattern 1					
SMTC Configuration								
SSB Configuration	Config 1,2							
_	Config 3							
PDSCH/PDCCH	Config 1,2	۷⊔¬	SSB.2 FR1					
subcarrier spacing	Config 3	NI IZ						
PUCCH/PUSCH	Config 1,2	kHz						
subcarrier spacing	Config 3	IXI IZ						
PRACH configuration				FR1			on 1	
BWP configuraiton	Initial DL BWP							
	Dedicated DL				DLBW	P.1.1		
	BWP							
					ULBW	P.1.1		
EDDE **** -	BWP							
EPRE ratio of PSS to SS								
EPRE ratio of PBCH by								
EPRE ratio of PBCH to F								
EPRE ratio of PDCCH to								
EPRE ratio of PDCCH to		dB	0					
EPRE ratio of PDSCH D EPRE ratio of PDSCH to								
	OCINO DIVIRO (INOTE							
1) Note2		dBm/15kH				0		
TV _{oc}		Z			-9			
Config 1,2					-9	8		

$N_{oc}^{ m Note2}$ Config 3		dBm/SCS	-95						
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	8 -3.3 -3.3		-3.3	- Infinity	2.36	2.36	
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		8 8		8	- Infinity	11	11	
IoNote3	Config 1,2	dBm/ 9.36MHz	-64.7	-60.87	-60.87	-64.7	-60.87	-60.87	
10,40,60	Config 3	dBm/ 38.16MHz	-60.55	-57.36	-57.36	-60.55	-57.36	-57.36	
Propagation condition		-	AWGN						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 220 ms from the beginning of time period T3. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 210 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.2.2.$

This gives a total of 220 ms.

A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.2.2-2, and A.6.3.1.2.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.2.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description				
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.3.1.2.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Inf	formation	-	Not Sent	No additional delays in random
				access procedure.
PRACH configura	tion index		FR1 PRACH configuration 1	As specified in table Table 6.3.3.2-
				3 in TS 38.211 [6]
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit	Cell 1		Cell 2		
		Unit	T1	T2	T1	T2	
NR RF Channel Number	•			1		1	
Duplex mode	Config 1			F	DD		
Duplex mode	Config 2,3			TE	DD		
	Config 1			Not Ap	plicable		
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDC	onf. 2.1		
	Config 1				B,c = 52		
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
	Config 1		10: N _{RB,c} = 52				
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
DRx Cycle	1	ms			plicable		
PDSCH Reference	Config 1				1 FDD		
measurement channel	Config 2				1 TDD		
Thousand the the third the	Config 3				1 TDD		
CORESET Reference	Config 1				1 FDD		
Channel	Config 2				1 TDD		
Chambi	Config 3				1 TDD		
	Config 1				.1 FDD		
TRS configuration	Config 2		TRS.1.1 TDD				
	Config 3		TRS.1.2 TDD				
OCNG Patterns			OCNG pattern 1				
SMTC Configuration			SMTC pattern 1				

SSR Configuration Config 1,2				SSB.1 FR1					
SSB Configura	ition	Config 3				2 FR1			
PDSCH/PDCC	Н	Config 1,2		15 kHz					
subcarrier space			kHz	30 kHz					
PUCCH/PUSC		Config 1,2	1.1.1-	15 kHz					
subcarrier space	cing	Config 3	kHz		30	kHz			
PRACH config	uration				FR1 PRACH	configuration 1			
		Initial DL BWP			DLBV	VP.0.1			
		Dedicated DL			DLBV	VP.1.1			
BWP configura	tion	BWP							
DVVF Configura	IIIOH	Initial UL BWP				VP.0.1			
		Dedicated UL			ULBV	VP.1.1			
		BWP							
EPRE ratio of I									
EPRE ratio of I									
EPRE ratio of I				0					
EPRE ratio of I									
EPRE ratio of I	PDCCH to	PDCCH DMRS	dB						
EPRE ratio of I	PDSCH D	MRS to SSS	ub	U					
EPRE ratio of I	PDSCH to	PDSCH							
EPRE ratio of (OCNG DN	MRS to SSS(Note 1)							
EPRE ratio of (OCNG to	OCNG DMRS (Note							
1)									
$N_{oc}^{$			dBm/15kH	-98					
			Z						
	nfig 1,2					98			
"	nfig 3		dBm/SCS		-6	95			
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$			dB	8	-0.64	-Infinity	-0.64		
\hat{E}_s/N_{oc}		dB	8	8	-Infinity	8			
	Io ^{Note3} Config 1,2 Config 3		dBm/ 9.36MHz	-64.7	-62.37	-64.7	-62.37		
Co			dBm/ 38.16MHz	-60.55	-58.66	-60.55	-58.66		
Propagation condition - AWGN									
Note 1: OCN	NG shall b	e used such that both	cells are fully a	allocated and a	constant total	I transmitted po	wer 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 parameters themselves.

A.6.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 282 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 232$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 282 ms.

A.6.3.1.3 Inter-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 inter frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.3.2-2, and A.6.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.3.2-1: Inter-frequency handover from FR1 to FR1 test configurations

Config	Description				
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.3.1.3.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Pai	Parameter		Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	-4	
Hysteresis	Hysteresis		0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	Access Barring Information		Not Sent	No additional delays in random
				access procedure.
T1	T1		5	
T2		S	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Doromotor		Unit	Cell 1		Cell 2			
Falai	Parameter		T1	T2	T1	T2		
NR RF Channel Numb	er		,	1	2	2		
Duplex mode	Config 1		FDD					
Duplex mode	Config 2,3							
	Config 1		Not Applicable					
TDD configuration	Config 2			TDDC	onf.1.1			
	Config 3		TDDConf.2.1					
	Config 1		10: N _{RB,c} = 52					
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52					
	Config 3		40: N _{RB,c} = 106					

	Config 1			10: N _R	в,с = 52			
BWP BW	Config 2	MHz	10: N _{RB,c} = 52					
	Config 3	1	40: N _{RB,C} = 106					
	Config 1			TRS.1.1 FDD				
TRS configuration	Config 2				.1 TDD			
ga.a	Config 3				.2 TDD			
DRx Cycle		ms			plicable			
-	Config 1				1 FDD			
PDSCH Reference	Config 2	1		SR.1.	1 TDD			
measurement channe	Config 3			SR2.	1 TDD			
00DE0ET D-4	Config 1			CR.1.	1 FDD			
CORESET Reference Channel	Config 2			CR.1.	1 TDD			
Channel	Config 3			CR2.	1 TDD			
OCNG Patterns				OCNG p	oattern 1			
SMTC Configuration				SMTC p	oattern 1			
SSB Configuration	Config 1,2			SSB.	1 FR1			
· ·	Config 3			SSB.	2 FR1			
PDSCH/PDCCH	Config 1,2	kHz			kHz			
subcarrier spacing	Config 3	KI IZ			kHz			
PUCCH/PUSCH	Config 1,2	kHz			kHz			
subcarrier spacing	Config 3	NI IZ	30 kHz					
PRACH configuratio					configuration 1			
	Initial DL BWP		DLBWP.0.1					
	Dedicated DL		DLBWP.1.1					
BWP	BWP Initial UL BWP		ULBWP.0.1					
	Dedicated UL		ULBWP.1.1					
	BWP		OLDWI .I.I					
EPRE ratio of PSS to	o SSS							
EPRE ratio of PBCH	I DMRS to SSS							
EPRE ratio of PBCH	I to PBCH DMRS							
EPRE ratio of PDCC	CH DMRS to SSS							
EPRE ratio of PDCC	CH to PDCCH DMRS	dB		,	0			
EPRE ratio of PDSC		uБ		'	U			
EPRE ratio of PDSC	CH to PDSCH							
	G DMRS to SSS(Note 1)							
	G to OCNG DMRS (Note							
1)								
N_{oc}^{Note2}		dBm/15kH z		-(98			
	,2			-6	98			
N_{oc}^{Note2} Config 1,2 Config 3		dBm/SCS			95			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	4	4	-Infinity	5		
\hat{E}_s/N_{oc}		dB	4	4	-Infinity	5		
	Config 1,2		-67.11	-67.11	-70.05	-66.59		
Config 1	, <u> </u>	9.36MHz						
Io ^{Note3} Config 1 Config 3 Propagation condition	3	dBm/ 38.16MHz	-62.27	-62.27	-63.96 /GN	-61.92		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 282 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 272$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 282 ms.

A.6.3.1.4 SA NR - E-UTRAN handover

A.6.3.1.4.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	on Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The	UE is only required to be tested in one of the supported test configurations

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel N	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-Threshold2EU	TRAN	dBm	-98	Absolute E-UTRAN RSRP
				threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Inf	ormation	-	Not sent	No additional delays in random
				access procedure
Time offset between	en cells		3 ms	Asynchronous cells
Gap pattern config	guration Id		0	As specified in Table 9.1.2-1
				started before T2 starts
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Pa	rameter	Unit	Configuration		Cell 1		
				T1	T2	Т3	
RF channel nun	nber		1, 2, 3, 4, 5, 6	1			
Duplex mode			1, 4		FDD		
			2, 3, 5, 6		TDD		
TDD Configurat	ion		2, 5		TDDConf.1.1		
			3, 6		TDDConf.1.2		
BW _{channel}		MHz	1, 4	10:	$N_{RB,c} = 52$ (FC	D)	
			2, 5	10: N _{RB,c} = 52 (TDD)			
			3, 6	40:	$N_{RB,c} = 106 (TI)$	DD)	
	ce measurement		1, 4		SR.1.1 FDD		
channel			2, 5	SR.1.1 TDD			
			3, 6	SR.2.1 TDD			
CORSET refere	ence channel		1, 4	CR.1.1 FDD			
			2, 5	CR.1.1 TDD			
			3, 6	CR.2.1 TDD			
TRS configurati	on		1, 4	TRS.1.1 FDD			
			2, 5		TRS.1.1 TDD		
			3, 6	TRS.1.2 TDD			
OCNG pattern ^N			1, 2, 3, 4, 5, 6		OP.1		
	Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1		
BWP	Dedicated DL BWP				DLBWP.1.1		
DVVF	Initial UL BWP				ULBWP.0.1		
	Dedicated UL BWP				ULBWP.1.1		
SMTC configura	ation		1, 2, 3, 4, 5, 6	SMTC.1			

SSB configuration		1, 2, 4, 5	SSB.1 FR1		
		3, 6	SSB.2 FR1		
b2-Threshold1	dBm	1, 2, 4, 5	-96		
	UDIII	3, 6	-93		
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to					
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to					
SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS	dB		0		
EPRE ratio of PDSCH_DMRS to					
SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS					
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-100		
N _{oc} Note2	dBm/SCS	1, 2, 4, 5	-100		
		3, 6	-97		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	012	0-4	0-4
Ê _s /I _{ot} ^{Note3}	dB	1, 2, 3, 4, 5, 6	012	0-4	0-4
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104	-104
		3, 6	-85	-101	-101
	dBm/9.36	1, 2, 4, 5	-59.78	-70.59	-70.59
Io ^{Note3}	MHz				
	dBm/38.16	3, 6	-53.68	-64.49	-64.49
	MHz				
Propagation condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low		
Correlation Matrix					

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/l_{ot}, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration		Cell 2			
			T1	T2	Т3		
RF channel number		1, 2, 3, 4, 5, 6	2				
Duplex mode		1, 2, 3	FDD TDD				
		4, 5, 6					
TDD special subframe configuration ^{Note1}		4, 5, 6	6				
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1				
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50				
				20 MHz: N _{RB,c} = 100			
PRACH		1, 2, 3		4			
Configuration ^{Note2}		4, 5, 6	53				
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD				

DL Reference				20 MHz: R.6 FDD		
Measurement		4, 5, 6	5 MHz: R.4 TDD			
Channel ^{Note3}		4, 3, 0	10 MHz: R.4 TDD			
				20 MHz: R.3 TDD		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD			
parameters:		1, 2, 0		10 MHz: R.6 FDD		
DL Reference				20 MHz: R.10 FDD		
Measurement		4, 5, 6		5 MHz: R.11 TDD		
Channel ^{Note3}		1, 0, 0	10 MHz: R.6 TDD			
			20 MHz: R.10 TDD			
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OP.20 FDD			
		1, _, =	10 MHz: OP.10 FDD 20 MHz: OP.17 FDD			
		4, 5, 6	5 MHz: OP.9 TDD			
		, ,		10 MHz: OP.1 TDD		
				20 MHz: OP.7 TDD		
PBCH_RA		1, 2, 3, 4, 5, 6				
PBCH_RB	1					
PSS_RA	1					
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			
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	8	78	
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	78	78	
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90	
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90	
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21	-58.57	-58.57	
			+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN			
Antenna Configuration		1, 2, 3, 4, 5, 6	1x2 Low			
and Correlation Matrix Note7						

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 35$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell

A.6.3.1.5.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.5-1. General test parameters are provided in Table A.6.3.1.5-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.5-3 and A.6.3.1.5-4 respectively.

Table A.6.3.1.5-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.5-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		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		ell 1
55				T2	
RF channel num	ber		1, 2, 3, 4, 5, 6		1
Duplex mode			1, 4		DD
TDD Configuration			2, 3, 5, 6		DD
TDD Configuration	on		2, 5		onf.1.1 onf.1.2
BW _{channel}		MHz	3, 6 1, 4		= 52 (FDD)
DVV channel		IVII IZ	2, 5		= 52 (FDD) = 52 (TDD)
			3, 6		: 106 (TDD)
PDSCH reference	e measurement		1, 4		1 FDD
channel	o measurement		2, 5		1 TDD
			3, 6		1 TDD
CORSET referer	nce channel		1, 4		1 FDD
			2, 5		1 TDD
			3, 6		1 TDD
TRS configuration	n		1, 4		.1 FDD
			2, 5		.1 TDD
			3, 6		.2 TDD
OCNG pattern ^{Not}			1, 2, 3, 4, 5, 6		P.1
	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1
	Dedicated DL BWP			DLBV	VP.1.1
BWP	Initial UL BWP	-		ULBV	VP.0.1
	Dedicated UL BWP			ULBV	VP.1.1
SMTC configurat			1, 2, 3, 4, 5, 6	SM	TC.1
SSB configuration			1, 2, 4, 5		1 FR1
3			3, 6		2 FR1
EPRE ratio of PS	SS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PE	BCH_DMRS to				
SSS					
EPRE ratio of PE	3CH to				
PBCH_DMRS	20011 21120				
EPRE ratio of PD	DCCH_DMRS to				
SSS	200114				
EPRE ratio of PE PDCCH_DMRS	DCCH to	dB			0
EPRE ratio of PI	DECH DMDS to	ub			U
SSS	DOCI I_DIVING TO				
EPRE ratio of PD	OSCH to				
PDSCH_DMRS	3001110				
EPRE ratio of O	CNG DMRS to				
SSS					
EPRE ratio of O	CNG to OCNG				
DMRS					
N _{oc} Note2		dBm/15 KHz dBm/SCS	1, 2, 3, 4, 5, 6		98
N _{oc} Note2	N _{oc} Note2		1, 2, 4, 5 3, 6		98 95
Ês/Noc		dB	1, 2, 3, 4, 5, 6	0	0
Ê _s /I _{ot} Note3		dB	1, 2, 3, 4, 5, 6	0	0
SS-RSRP ^{Note3}			1, 2, 4, 5	-98	-98
		dBm/SCS	3, 6	-95	-95
I Noto?		dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04
Io ^{Note3}		dBm/38.16 MHz	3, 6	-60.94	-60.94
		IVII IZ	l		

Propagati	ion condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna (Configuration and 1, 2, 3, 4, 5, 6 1x2 Low					
Correlation	on Matrix					
Note 1:	OCNG shall be used such	that both cells a	re fully allocated ar	nd 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:	Ê₅/l₀t, SS-RSRP, and lo levels have been derived from other parameters for information purposes.					
	They are not settable para	ameters themselv	es.			

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
			T4 T0
RF channel number		1, 2, 3, 4, 5, 6	T1 T2
Duplex mode		1, 2, 3	FDD
Duplex mode		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	5 MHz: N _{RB,c} = 25
			10 MHz: N _{RB,c} = 50
			20 MHz: N _{RB,c} = 100
PRACH Configuration ^{Note2}		1, 2, 3	4
		4, 5, 6	53
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD
DL Reference Measurement		, ,	10 MHz: R.3 FDD
Channel ^{Note3}			20 MHz: R.6 FDD
		4, 5, 6	5 MHz: R.4 TDD
		, ,	10 MHz: R.0 TDD
			20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD
parameters:		, ,	10 MHz: R.6 FDD
DL Reference Measurement			20 MHz: R.10 FDD
Channel ^{Note3}		4, 5, 6	5 MHz: R.11 TDD
		, , , ,	10 MHz: R.6 TDD
			20 MHz: R.10 TDD
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OP.20 FDD
		, ,	10 MHz: OP.10 FDD
			20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD
		, ,	10 MHz: OP.1 TDD
			20 MHz: OP.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6	
PBCH_RB			
PSS_RA			
SSS_RA			
PCFICH_RB			
PHICH_RA			
PHICH_RB	dB		0
PDCCH_RA			-
PDCCH_RB			
PDSCH_RA			
PDSCH_RB			
OCNG_RA ^{Note4}			
OCNG_RB ^{Note4}			
00110_1\0			

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					
lo ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43					
Propagation Condition		1, 2, 3, 4, 5, 6	AW	'GN					
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low						
Correlation Matrix Note7									
Note 1: Special subframe and unlink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]									

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 115$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.6.3.2 RRC Connection Mobility Control

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is on	ly required to be tested in one of the supported test configurations.

Table A.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3 1, 2, 3	0	Radio link failure timer; T310 is disabled
T311	T311			3000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	•
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC pattern 2	
			2	SMTC pattern 1	
			3	SMTC pattern 1	
DRX cycle length		S	1, 2, 3	OFF	
PRACH configuration index			1, 2, 3 1, 2, 3	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter Unit		Test	Cell 1			Cell 2				
		configuration	T1	T2	Т3	T1	T2	T3		
TDD configuration		1		N/A			N/A			
-		2		DDConf.1.		TDDConf.1.1				
		3	T	DDConf.2.	1	Т	DDConf.2.	.1		
PDSCH RMC		1		SR.1.1 FDD			N/A			
configuration		2	5	SR.1.1 TDD)					
		3	5	SR.2.1 TDD)					
RMSI CORESET		1		CR.1.1 FDD)	(R.1.1 FDI	D		
RMC configuration		2	CR.1.1 TDD CR.1.1 TDD					D		
		3		CR.2.1 TDD			CR.2.1 TDI			
Dedicated CORESET		1	С	CR.1.1 FDI	D	С	CR.1.1 FD	D		
RMC configuration		2	С	CR.1.1 TDI)	С	CR.1.1 TD	D		
		3		CR.2.1 TDI			CR.2.1 TD			
OCNG Pattern		1, 2, 3		defined in A			defined in A			
TRS configuration		1		RS.1.1 FDI			N/A			
3		2		RS.1.1 TDI						
		3		RS.1.2 TDI						
Initial DL BWP		1, 2, 3		DLBWP.0.1		[DLBWP.0.	1		
configuration		, , -	DEBWY .o. 1							
Initial UL BWP		1, 2, 3	l (JLBWP.0.1		ULBWP.0.1				
configuration		1, =, =]				
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW		
confgiuration		, , -	1.1					P.1.1		
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW		
configuration		, , -	1.1					P.1.1		
RLM-RS		1, 2, 3		SSB			SSB	'		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	1.54	-infinity	-infinity	-3.79	4	4		
S _s / T _{ot}		2	1		,					
		3								
N 7	dBm/SCS	1		1	-98		l	1		
N_{oc} Note2	<u> </u>	2			-98					
		3			-95					
N T	dBm/15 kHz	1			-98					
N_{oc} Note2	45111/10 III 12	2	1		00					
		3	1							
\hat{E}_s/N_{oc}	dB	1	7	-infinity	-infinity	4	4	4		
E_s/N_{oc}	QD.	2	1 '	ii ii ii ii ii y		7	7			
		3								
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94		
33-K3KI	ubili/303	2	-91	-infinity	-infinity	-94	-94	-94		
		3	-88	-infinity	-infinity	-94 -91	-9 4 -91	-9 4 -91		
lo	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59		
IU	dBm/9.36 MHz	2	-60.74	-64.59	-64.59 -64.59	-60.74	-64.59 -64.59	-64.59		
-			-60.74 -54.65			-54.65				
Dropogation	dBm/38.16 MHz	3	-54.65	-58.50	-58.50		-58.50	-58.50		
Propagation		1, 2, 3			AWG	IN				
Condition		<u> </u>	<u> </u>							

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.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_delay} = T_{UL_grant} + T_{UE_re-establish_delay}$$
.

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{\textit{UE_re-establish_delay}} = 50 \; \text{ms} + T_{\textit{identify_intra_NR}} + \sum_{i=1}^{\textit{Nfreq-1}} T_{\textit{identify_inter_NR},i} + T_{\textit{SI-NR}} + T_{\textit{PRACH}}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 200 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell					
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD					
	duplex mode	duplex mode					
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD					
	duplex mode	duplex mode					
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD					
	duplex mode	duplex mode					
Note: The L	Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1, 2	
Time offset	between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311	-		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310			1, 2, 3	0	Radio link failure timer; T310 is disabled
T311	T311		1, 2, 3	5000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
DDV social law with			4 0 0	pattern 1	
DRX cycle length		S	1, 2, 3 1, 2, 3	OFF 87	The detailed configuration is an actical in
PRACH configuration index			, ,		The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	5	

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	Т3		
RF Channel Number		1, 2, 3		1	1 2					
TDD configuration		1		N/A			N/A			
		2	T	DDConf.1.		Т	DDConf.1.	1		
		3	TDDConf.2.1				TDDConf.2.1			
PDSCH RMC		1	(SR.1.1 FDD			N/A			
configuration		2	5	SR.1.1 TDD]				
		3	5	SR.2.1 TDD		1				
RMSI CORESET		1	(CR.1.1 FDD	1	CR.1.1 FDD				
RMC configuration		2	(CR.1.1 TDD	ı	CR.1.1 TDD				
		3	CR.2.1 TDD		CR.2.1 TDD CR.2.1 TDD)			
Dedicated CORESET		1	С	CR.1.1 FDI)	C	CR.1.1 FD	D		
RMC configuration		2 CCR.1.1 T		CR.1.1 TDI	2.1.1 TDD CCR.1.1 T		CR.1.1 TD	D		
		3	CCR.2.1 TDD)	CCR.2.1 TDD				
OCNG Pattern		1, 2, 3	OP.1 (defined in A	.3.2.1	OP.1 c	lefined in A	.3.2.1		
TRS configuration		1	Т	RS.1.1 FDI)		N/A			

		2	TI	RS.1.1 TDI)			
		3	TI	RS.1.2 TDI)			
Initial DL BWP		1, 2, 3		DLBWP.0			DLBWP.0	
configuration								
Initial UL BWP		1, 2, 3	ULBWP.0 ULBWP.0					
configuration								
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB			SSB	
\hat{E}_{s}/I_{ot}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
37 00		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
oc Note2		2	-98					
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
TV _{oc} Note2		2						
		3						
\hat{E}_s/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
37 00		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91
		2	-94	-infinity	-infinity	-infinity	-infinity	-91
		3	-91	-infinity	-infinity	-infinity	-infinity	-88
lo	dBm/9.36 MHz	1	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/9.36 MHz	2	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation		1, 2, 3	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $^{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; ms + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify_intra_NR} = 800 \ ms$

 $T_{identify_inter_NR} = 800 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

Configuration	Description					
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter				Value	Comment
Initial	A ativo a all		configuration	Cell1	
	Active cell		1, 2, 3		
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311		ms	1, 2, 3	3000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access
					procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC	
				pattern 2	
			2	SMTC	
				pattern 1	
			3	SMTC	
				pattern 1	
DRX cycle length		S	1, 2, 3	OFF	
PRACH configuration index			1, 2, 3	87	The detailed configuration is specified in clause 6.3.3.2 of TS 38.211 [6]
T1		S	1, 2, 3	5	
T2		S	1, 2, 3	6	Time for the UE to detect RLF
T3		S	1, 2, 3	3	

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			N/A	•
· ·		2	Т	TDDConf.1.1		TDDConf.1.1		
		3	Т	DDConf.2.	1	TDDConf.2.1		1
PDSCH RMC		1	5	SR.1.1 FDD)	N/A		
configuration		2	5	SR.1.1 TDD)			
		3	5	SR.2.1 TDD)	1		
RMSI CORESET		1	C	CR.1.1 FDD)	(CR.1.1 FDE)
RMC configuration		2	C	CR.1.1 TDD)	(CR.1.1 TDE)
_		3		CR.2.1 TDD			CR.2.1 TDE)
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2	С	CR.1.1 TDI	D	С	CR.1.1 TD	D
_		3	С	CR.2.1 TDI	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	\.3.2.1
Initial DL BWP		1, 2, 3]	DLBWP.0.1		[DLBWP.0.1	
configuration								
Initial UL BWP		1, 2, 3	ULBWP.0.1		ULBWP.0.1			
configuration								
RLM-RS		1, 2, 3		SSB		SSB		
\hat{E}_{s}/I_{ot}	dB	1	4	-infinity	-infinity	-infinity	-infinity	4
\$7 01		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
TV oc Note2		2			-98			
		3			-95			
N Note2	dBm/15 kHz	1			-98			
N_{oc} Note2		2						
		3						
\hat{E}_s/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	4
\$7 00		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-94
		2	-94	-infinity	-infinity	-infinity	-infinity	-94
		3	-91	-infinity	-infinity	-infinity	-infinity	-91
lo	dBm/9.36 MHz	1	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-58.50
Propagation Condition		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 $\frac{N_{oc}}{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used

$$T_{UE_re-establish_delay} = 50 \; \text{ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify\ intra\ NR} = 800\ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

A.6.3.2.2 Random Access

A.6.3.2.2.1 Contention based random access test in FR1 for NR standalone

A.6.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.1.1-1. UE capble of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.1.1-2.

Table A.6.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone

	Config	Description				
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only re capability	equired to be tested in one of the supported test configurations depending on UE				

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

SSB configuration		Parame	eter	Unit	Test-1	Comments
Number of SSBs per SS-burst 2			Config 1		SSB pattern 1 in FR1	except for number of SSBs per SS-burst and SS/PBCH block index as
Duplex Mode for Cell 2	Number of SS	Number of SSBs per SS-burst			2	Different from the
Config 2 TDD	SS/PBCH blo	SS/PBCH block index			0,1	
TDD Configuration	Duplex Mode	for Cell 2				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $			Config 2			
Note 2 Config 2 SR.2.1 TDD			1			
Config 2 SR.2.1 TDD		meters	Config 1			As defined in A.3.1.1.
EPRE ratio of PSS to SSS 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 EPRE ratio of PDCCH to PDCCH_DMRS to SSS dB EPRE ratio of PDSCH_DMRS to SSS dB EPRE ratio of PDSCH_DMRS to SSS dB SSB with index 0 Double to PDSCH_DMRS SSB with index 0 Double to PDSCH_DMRS EPRE ratio of PDSCH to PDSCH_DMRS dB SSB with index 0 Double to PDSCH_DMRS EPRE ratio of PDSCH_DMRS to SSS dB BEPRE ratio of PDSCH_DMRS to SSS dB BEPRE ratio of PDSCH_DMRS to SSS dB BEPRE ratio of PDSCH_DMRS to SSS dB SSB with index 1 Double to Post of SSB with index 0 is set to be above configured rsrp. ThresholdSSB BEPRE ratio of PDSCH_DMRS to SS dB SS-RSRP Note 3 dBm/15kHz SSB with index 1 Double to Below to	Note 4		Config 2		SR.2.1 TDD	
EPRE ratio of PBCH_DMRS to SSS dB EPRE ratio of PBCH to PBCH_DMRS dB EPRE ratio of PDCCH_DMRS to SSS dB EPRE ratio of PDCCH to PDCCH_DMRS dB EPRE ratio of PDSCH_DMRS to SSS dB EPRE ratio of PDSCH_DMRS to SSS dB EPRE ratio of PDSCH_DMRS to SSS dB SSB with index 0 dB 3 SSB with index 0 Config 1 dBm/15kHz -98 SSB with index 1 Config 2 dB 3 SS-RSRP Note 3 dBm/ SCS -95 Es_I/Not dB -17 Power of SSB with index 1 is set to be below configured rsrp-ThresholdSSB Io Note 2 Config 1 dBm/15kHz -98 1 is set to be below configured rsrp-ThresholdSSB Io Note 2 Config 1 dBm/ SCS -115 For symbols without SSB index 1 Io Note 2 Config 2 dBm/ SCS -115 For symbols without SSB index 1 Io Note 2 Config 2 -65.3/9.36MHz For symbols without SSB index 1 Io SS-PBCH-BlockPower dBm/ SCS -5 As defined in clause 6.3.2 in T					1	
EPRE ratio of PBCH to PBCH_DMRS dB EPRE ratio of PDCCH DMRS to SSS dB EPRE ratio of PDCCH to PDCCH_DMRS dB EPRE ratio of PDSCH DMRS to SSS dB EPRE ratio of PDSCH to PDSCH_DMRS dB SSB with index 0 DSCH to PDSCH_DMRS EPRE ratio of PDSCH to PDSCH_DMRS dB SSB with index 0 Config 1 Config 1 dBm/15kHz Config 2 dB -101 3 SS-RSRP Note 3 dBm/ SCS SSB with index 1 -98 Config 1 dBm/ SCS -95 -17 SSB with index 1 -98 Config 1 dBm/ SCS -101 -98 Config 2 -101 Ex/Noc dB SS-RSRP Note 3 dBm/ SCS -101 -101 Ex/Noc dBm/ SCS -115 -101 Ex/Noc dBm/ SCS -115 -5.3/9.36MHz For symbols without SSB index 1 Ss-PBCH-BlockPower					_	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
					_	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				dB		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	EPRE ratio of					Davis of OOD with in day
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SSB with	E_s/I_{ot}		-		
$\frac{\hat{E}_s/N_{oc}}{\text{SS-RSRP}^{\text{Note 3}}} \qquad \text{dB} \qquad 3$ $\frac{\hat{E}_s/I_{ot}}{\text{SSB with index 1}} \qquad \frac{\hat{E}_s/I_{ot}}{\text{Config 2}} \qquad \text{dB} \qquad -17 \qquad \text{Power of SSB with index 1}$ $\frac{\hat{E}_s/I_{ot}}{\text{Config 2}} \qquad \text{dB} \qquad -17 \qquad \text{Power of SSB with index 1} \qquad 1 \text{ is set to be below configured } rsrp- \\ \hline \frac{\hat{E}_s/N_{oc}}{\text{Config 2}} \qquad \text{dB} \qquad -17 \qquad \\ \hline \frac{\hat{E}_s/N_{oc}}{\text{SS-RSRP}^{\text{Note 3}}} \qquad \text{dBm/SCS} \qquad -115 \qquad \\ \hline \frac{\text{Config 1}}{\text{Config 2}} \qquad \frac{\text{dBm}}{\text{Config 2}} \qquad -65.3/9.36\text{MHz} \qquad \text{For symbols without SSB index 1} \\ \hline \frac{\text{ss-PBCH-BlockPower}}{\text{Configured UE transmitted power (}} \qquad \frac{\text{dBm}}{\text{SCS}} \qquad -5 \qquad \text{As defined in clause 6.3.2 in TS 38.331 [2].} \\ \hline \text{PRACH Configuration} \qquad - \qquad \text{FR1 PRACH configuration 1} \qquad \text{As defined in A.3.x.} \\ \hline \text{Propagation Condition} \qquad - \qquad \text{AWGN} \qquad - \\ \hline \end{tabular}$		N_{oc}	•	dBm/15kHz		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						ThresholdSSB
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		\hat{E}_s/N_{oc}		dB	3	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				dBm/ SCS	-95	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		\hat{E}_s/I_{ot}		dB	-17	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				dBm/15kHz	-98	
	IIIdex I	1 oc	Config 2	1	-101	
		\hat{E}_s/N_{oc}		dB	-17	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		SS-RSR	P Note 3	dBm/ SCS	-115	
Config 2-62.2/38.16MHzINGEX 1ss-PBCH-BlockPowerdBm/SCS-5As defined in clause 6.3.2 in TS 38.331 [2].Configured UE transmitted power ($P_{CMAX,f,c}$)dBm23As defined in clause 6.2.4 in TS 38.101-1.PRACH ConfigurationFR1 PRACH configuration 1As defined in A.3.x.Propagation Condition-AWGN	I Note 2		Config 1	dBm	-65.3/9.36MHz	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	IO Note 2	O Note 2			-62.2/38.16MHz	index 1
	ss-PBCH-BlockPower		dBm/ SCS	-5		
PRACH Configuration FR1 PRACH configuration 1 As defined in A.3.x. Propagation Condition - AWGN			dBm	23	As defined in clause	
		iguration			FR1 PRACH configuration 1	As defined in A.3.x.
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted 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: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in 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 an UL grant for msg3 retransmission

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.4.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capble of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.6.3.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only recapability	equired to be tested in one of the supported test configurations depending on UE

Table A.6.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

	Paramet		Unit	Test-1	Test-2	Comments
SSB Configu	ıration	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
						index as below
Number of S	Number of SSBs per SS-burst			2	2	Different from the
Number of S	ова рег оо	-Dui3t		2	2	definition in A.3.10
SS/PBCH blo	ock index			0,1	0,1	Different from the
				-, -		definition in A.3.10
CSI-RS Conf	figuration	Config 1		N/A	CSI-RS.1.1 FDD	As defined in
		Config 2			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode	e for Cell 2	Config 1		FDD	FDD	
		Config 2		TDD	TDD	
TDD Configu	ıration	Config 2		TDDConf.1.2	TDDConf.1.2	
OCNG Patte	rn ^{Note 1}			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH para	meters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 2	_	SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
	NR RF Channel Number			1	1	
	EPRE ratio of PSS to SSS		dB			
EPRE ratio o			dB			
		PBCH_DMRS	dB			
		OMRS to SSS	dB	0 0		
		PDCCH_DMRS	dB			
		MRS to SSS	dB			
EPRE ratio d		PDSCH_DMRS	dB dB	3	3	Power of SSB with
SSB with	\hat{E}_s/I_{ot}	T				index 0 is set to be
index 0	N_{oc}	Config 1	dBm/15kHz	-98	-98	above configured
	oc	Config 2		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	
	SS-RSRI	Note 3	dBm/ SCS	-95	-95	
	\hat{E}_s/I_{ot}		dB	-17	-17	Power of SSB with
SSB with index 1	N_{oc}	Config 1	dBm/15kHz	-98	-98	index 1 is set to be below configured
ilidex i	1 voc	Config 2		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	-17	
	SS-RSRI	Note 3	dBm/ SCS	-115	-115	1
. Nete 0	•	Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
lo Note 2		Config 2		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-Blo	ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{ m CMAX,f,c}$)		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-	
PRACH Con	PRACH Configuration			FR1 PRACH	FR1 PRACH	As defined in
Drongastica	Condition			configuration 2	configuration 3	A.3.8.2.
Propagation		1 1 1 1 1 1		AWGN	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2:	SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not
	settable parameters.
Note 3:	Void
Note 4:	The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to
	the UE under test is required.

A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in 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 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 transmission, 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in 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.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description					
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Pai	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random
				access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	1	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Davam	-1	l lmit	Cel	I 1	Cell 2		
Param		Unit	T1	T2	T1	T2	
NR RF Channel Numbe			1		2	2	
Duplex mode	Config 1 Config 2,3	-	FDD TDD				
TDD configuration	Config 1			Not Ap			
	Config 2	-		TDDC			
	Config 3	-		TDDC			
	Config 1			10: N _R	_{B,c} = 52		
BW _{channel}	Config 2	MHz		10: N _R			
	Config 3	=	40: N _{RB,c} = 106				
	Config 1		10: N _{RB,c} = 52				
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
DRx Cycle		ms		Not App	olicable		
	Config 1			SR.1.	1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD				
	Config 3		SR2.1 TDD				
CORESET Reference	Config 1			CR.1.	1 FDD		
Channel	Config 2		CR.1.1 TDD				

		Config 3	CR2.1 TDD					
OCNG Patterns				OCNG p	attern 1			
ONTO "		Config 1,2		SMTC.1 FR1				
SMTC confi	guration	Config 3	1	SMTC.2 FR1				
PDSCH/PD	CCH	Config 1,2			15	kHz		
subcarrier s		Config 3	kHz		30 I	kHz		
PUCCH/PU	SCH	Config 1,2			15	kHz		
subcarrier s		Config 3	- kHz		30 I	kHz		
PRACH con	figuration				FR1 PRACH o	configuration 1		
BWP config	uraiton	Initial DL BWP			DLBW	/P.0.1		
	Dedicated DL BWP Initial UL BWP				DLBW	/P.1.1		
				ULBWP.0.1				
		Dedicated UL BWP			ULBW	/P.1.1		
EPRE ratio	EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note		dB	0				
$N_{oc}^{ m Note2}$			dBm/15kH z		-98			
	Config 1,2				-6			
	Config 3		dBm/SCS		-9	95	Τ	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			dB	4	4	-infinity	4	
\hat{E}_s/N_{oc}			dB	4	4	-infinity	4	
	Config 1,2		dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59	
	Config 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49	
Propagation			-		AW			
Note 1: C	CNG shall b	be used such that both	cells are fully	allocated and a	constant total	transmitted po	wer spectral	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectra 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.

A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 960 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

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

where:

 $T_{RRC_procedure_delay} = 110$ ms and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = 680$ ms in the test.

 $T_{\text{SI-NR}} = 0$ ms is assumed, since 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.

 $T_{RACH} = 170 \text{ ms in the test.}$

This gives a total of 960 ms.

A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.2.3.2.2-2: General test parameters for Redirection from NR to E-UTRAN test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2	<u>-</u>	S	1	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Parameter	Unit	Cell 1		
Farameter	Onit	T1	T2	
RF Channel Number		1		

Duplex mode	Config 1		FDD
	Config 2,3		TDD
	Config 1	<u>-</u>	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		ms	Not Applicable
	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 pattern 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	KI IZ	30 kHz
PUCCH/PUSCH	Config 1,2	kHz	15 kHz
subcarrier spacing	Config 3	KI IZ	30 kHz
PRACH configuration			FR1 PRACH configuration 1
BWP configuration	Initial DL BWP		DLBWP.0.1
	Dedicated DL		DLBWP.1.1
	BWP Initial UL BWP		ULBWP.0.1
	Dedicated UL		ULBWP.1.1
]	
EPRE ratio of PSS to SS	BWP SS		
EPRE ratio of PSS to SS EPRE ratio of PBCH DM	SS IRS to SSS		
EPRE ratio of PBCH DM EPRE ratio of PBCH to I	SS IRS to SSS PBCH DMRS		
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH D	SS MRS to SSS PBCH DMRS MRS to SSS		
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH D EPRE ratio of PDCCH to EPRE ratio of PDCCH to	SS MRS to SSS PBCH DMRS MRS to SSS PDCCH DMRS	dB	0
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DE EPRE ratio of PDCCH to EPRE ratio of PDSCH DE EPRE ratio of PDSCH DE EPRE ratio of PDSCH to	PBCH DMRS DMRS to SSS	dB	0
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DE EPRE ratio of PDCCH to EPRE ratio of PDSCH DE EPRE ratio of PDSCH DE EPRE ratio of PDSCH to EPRE ratio of OCNG DM	PBCH DMRS PBCH DMRS PMRS to SSS PDCCH DMRS PDCCH DMRS PDCCH DMRS PDSCH MRS to SSS PDSCH MRS to SSS(Note 1)	dB	0
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DE EPRE ratio of PDCCH to EPRE ratio of PDSCH DE EPRE ratio of PDSCH DE EPRE ratio of PDSCH to	PBCH DMRS PBCH DMRS PMRS to SSS PDCCH DMRS PDCCH DMRS PDCCH DMRS PDSCH MRS to SSS PDSCH MRS to SSS(Note 1)	dB dBm/15kH	0

$N_{oc}^{ m Note2}$	Config 1,2		-9	98
1 voc	Config 3		-9	95
\hat{E}_{s}/I_{ot}		dB	4	4
\hat{E}_s/N_{oc}		dB	4	4
Io ^{Note3}	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59
10.1010	Config 3	dBm/ 38.16MHz	-58.49	-58.49
Propagati	on condition	-	AW	GN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.2.3.2.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

Parameter	Unit	Configuration	Cell 2
			T1 T2
RF channel number		1, 2, 3, 4, 5, 6	2
Duplex mode		1, 2, 3	FDD
		4, 5, 6	TDD
TDD special subframe configuration ^{Note1}		4, 5, 6	6
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100
PRACH Configuration ^{Note2}		1, 2, 3	4
		4, 5, 6	53
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD
DL Reference Measurement			10 MHz: R.3 FDD
Channel ^{Note3}			20 MHz: R.6 FDD
		4, 5, 6	5 MHz: R.4 TDD
			10 MHz: R.0 TDD
			20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD
parameters:			10 MHz: R.6 FDD
DL Reference Measurement			20 MHz: R.10 FDD
Channel ^{Note3}		4, 5, 6	5 MHz: R.11 TDD
			10 MHz: R.6 TDD
			20 MHz: R.10 TDD
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OP.20 FDD
			10 MHz: OP.10 FDD
			20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD
			10 MHz: OP.1 TDD
			20 MHz: OP.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6	
PBCH_RB			
PSS_RA	dB		0
SSS_RA			Č
PCFICH_RB			
PHICH_RA			

PHICH_RB				
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	-9	8
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	4
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
	ID /01411	4 0 0 4 5 0	70.00	04.70
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: 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.
 - Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 925 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

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

where:

Note 7:

 $T_{RRC procedure delay} = 110 \text{ ms}$ and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-E-UTRA} = 800 \text{ ms in the test.}$

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

 $T_{RACH} = 15$ ms in the test.

This gives a total of 925 ms.

A.6.4 Timing

A.6.4.1 UE transmit timing

A.6.4.1.1 NR UE Transmit Timing Test for FR1

A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 6.4.1.1.1-1

Table A.6.4.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE configur	is only required to be tested in one of the supported test ations

For this test a single NR cell is used. Table A.6.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.6.4.1.1.1-3.

Table A.6.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1,2,3	1	1
		1	Not Ap	plicable
TDD configuration		2	TDDC	onf.1.1
		3	TDDC	onf.1.2
		1	10: NRI	3,c = 52
BW _{channel}	MHz	2	10: N _R	B,c = 52
		3		_{s,c} = 106
Initial BWP Configuration		1,2,3		/P.0.1 /P.0.1
Dedicated BWP Configuration		1,2,3	DLBW ULBW	/P.1.1 /P.1.1
DRx Cycle	ms	1,2,3	N/A	DRX.5 ^{Note5}
PDSCH Reference		1	SR.1.	1 FDD
measurement channel		2		1 TDD
		3	SR.2.	1 TDD
RMSI CORESET		1	CR.1.	1 FDD
Reference Channel		2	CR.1.	1 TDD
		3	CR.2.	1 TDD
Dedicated CORESET		1	CCR.1	.1 FDD
Reference Channel		2	CCR.1	.1 TDD
		3		.1 TDD
OCNG Patterns		1,2,3		P.1
SSB configuration		1,2	SSB.	
		3	SSB.2	
SMTC Configuration		1		ΓC.1
Civi C Cormiguration		3	SMT	ΓC.2
		1	TRS.1	.1 FDD
TRS configuration		2	TRS.1	.1 TDD
		3	TRS.1	.2 TDD
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS	dB	1,2,3	0	0
EPRE ratio of PBCH to PBCH DMRS				

EDDE rotio of DDCCH				
EPRE ratio of PDCCH				
DMRS to SSS				
EPRE ratio of PDCCH to				
PDCCH DMRS				
EPRE ratio of PDSCH				
DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH				
EPRE ratio of OCNG				
DMRS to SSS(Note 1)				
EPRE ratio of OCNG to				
OCNG DMRS (Note 1)				
$N_{oc}^{ m Note2}$	dBm/15 kHz	1,2,3	-98	-98
$N_{oc}^{ m Note2}$	JD /000	1,2	-98	-98
oc	dBm/SCS	3	-95	-95
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1,2,3	3	3
\hat{E}_s/N_{oc}		1,2,3	3	3
SS-RSRP ^{Note3}	4D/CCC	1,2	-95	-95
	dBm/SCS	3	-92	-92
Io ^{Note3}	dBm/9.36MHz	1,2	-65.2	-65.2
	dBm/38.1MHz	3	-59.2	-59.2
Propagation condition		1,2,3		'GN
SRS Config		1	Config1 ^{Note6}	Config3 ^{Note6}
		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.3.3.5-1
- Note 6: SRS configs are given in Table A.6.4.1.1.1-3

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	Config1	Config 2	Config 3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	0	
	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	sl1	sl1	sl1	
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 0	sl320, 0	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

Table A.6.4.1.1.1-4: Void

A.6.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Setup NR PCell according to parameters given in Table A.6.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

Table A.6.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustment Value		
	Test1	Test2	
15	+64*64T _c	+32*64T _c	
30	+32*64T _c	+16*64T _c	

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.6.4.2 UE timer accuracy

A.6.4.3 Timing advance

A.6.4.3.1 SA FR1 timing advance adjustment accuracy

A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.6.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	lote: 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	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	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	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192 * T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096 * T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Duplex mode	Test1		
Duplex mode			
TDD configuration			
TDD configuration			
Config 3 TDDConf.2.1			
BW Config 1			
BW channel Config 2 MHz 10: N _{RB,c} = 52 Config 3 40: N _{RB,c} = 106 BWP BW Config 1 10: N _{RB,c} = 52 Config 2 MHz 10: N _{RB,c} = 52 Config 3 40: N _{RB,c} = 106 DRx Cycle ms Not Applicable PDSCH Reference measurement channel Config 1 SR.1.1 FDD Config 3 SR2.1 TDD CORESET Config 1 CR.1.1 FDD CORESET Config 2 CR.1.1 TDD			
Config 3 40: N _{RB,c} = 106 Config 1 10: N _{RB,c} = 52 BWP BW Config 2 MHz 10: N _{RB,c} = 52 Config 3 40: N _{RB,c} = 106 DRx Cycle ms Not Applicable PDSCH Reference measurement channel Config 1 SR.1.1 FDD Config 3 SR2.1 TDD CORESET Config 1 CR.1.1 FDD CORESET Config 2 CR.1.1 TDD			
Config 1 10: NRB,c = 52			
BWP BW Config 2 MHz 10: N _{RB,c} = 52 Config 3 40: N _{RB,c} = 106 DRx Cycle ms Not Applicable PDSCH Reference Config 1 SR.1.1 FDD measurement Config 2 SR.1.1 TDD channel Config 3 SR2.1 TDD CORESET Config 1 CR.1.1 FDD			
Config 3			
DRx Cycle ms Not Applicable PDSCH Reference Config 1 SR.1.1 FDD measurement Config 2 SR.1.1 TDD channel Config 3 SR2.1 TDD CORESET Config 1 CR.1.1 FDD CORESET Config 2 CR.1.1 TDD			
DRx Cycle ms Not Applicable PDSCH Reference Config 1 SR.1.1 FDD measurement Config 2 SR.1.1 TDD channel Config 3 SR2.1 TDD CORESET Config 1 CR.1.1 FDD CORESET Config 2 CR.1.1 TDD			
measurement channel Config 2 Config 3 SR.1.1 TDD CORESET Config 1 Config 2 Config 2 Config 3 CR.1.1 FDD			
measurement channel Config 2 Config 3 SR.1.1 TDD CORESET Config 1 Config 2 Config 2 Config 3 CR.1.1 FDD			
CORESET Config 1 CR.1.1 FDD CR.1.1 TDD			
CORESET Config 2 CP 1 1 TDD			
1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
Reference Channel Config 3 CR2.1 TDD	CR2.1 TDD		
Config 1,4 TRS.1.1 FDD			
TRS configuration Config 2,5 TRS.1.1 TDD			
Config 3,6 TRS.1.2 TDD			
OCNG Patterns OCNG pattern 1			
SMTC Config 1,2 SMTC.1 FR1			
configuration Config 3 SMTC.2 FR1			
PDSCH/PDCCH Config 1,2 kHz 15 kHz			
subcarrier spacing Config 3 30 kHz			
PUCCH/PUSCH Config 1,2 kHz 15 kHz			
subcarrier spacing Config 3 30 kHz			
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS 0 0			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			

EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note			
1)			
Note2		dBm/15kH	-98
TV _{oc}	$N_{oc}^{ m Note2}$		-90
$N_{oc}^{ m Note2}$	Config 1,2	dBm/SCS	-98
Coni	Config 3	ubili/SCS	-95
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	3
\hat{E}_s/N_{oc}		dB	3
	Config 1,2	dBm/	-67.57
IoNote3	Corning 1,2	9.36MHz	-01.31
10	Config 3	dBm/	-62.58
	Corning 5		-02.00
Propagation	Propagation condition		AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment
Config 1,2		12	
c-SRS	Config 3	24	Fragues as happing 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		Codebook	Codebook based UL transmission
startPosition		0	resourceMapping setting. SRS on last
nrofSy	mbols	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	3.331 [2].

A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.6.5 Signalling characteristics

A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Para	meter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: $N_{RB,c} = 52$
	Config 2		10: N _{RB,c} = 52

Config 3				40: N _{RB,c} = 106	
DL initial BWP					
configuration				DLBWP.0.1	
	DL dedicated BWP Config 1, 2, 3			DLBWP.1.1	
configuration				DEBWI	
UL initial BWP		Config 1, 2, 3		ULBWP.0.1	
configuration UL dedicated B	N/D	Config 1, 2, 3			
configuration	, v v i	Coming 1, 2, 3		ULBWP.1.1	
TDD Configura	tion	Config 1		Not Applicable	
		Config 2		TDDConf.1.1	
		Config 3		TDDConf.2.1	
CORESET Ref	erence	Config 1		CR.1.1 FDD	
Channel		Config 2		CR.1.1 TDD	
		Config 3		CR.2.1 TDD	
SSB Configura	tion	Config 1		SSB.1 FR1	
		Config 2		SSB.1 FR1	
SMTC Configu	ration	Config 3 Config 1, 2		SSB.2 FR1 SMTC.1	
Sivi 10 Cornigui	aliUli	Config 1, 2		SMTC.1	
PDSCH/PDCC	H subcarrier	Config 1, 2		15 kHz	
spacing	i i subcamer	•			
		Config 3		30 kHz	
PRACH Config	uration	Config 1, 2		Table A.3.8.2.4-1	
		Config 3		Table A.3.8.2.4-1	
SSB index assi	gned as RLM	RS		0	
OCNG parame	ters			OP.1	
CP length				Normal	
Correlation Mat	trix and Anten	na Configuration		2x2 Low	
Out of sync	DCI format			1-0	
transmission		Control OFDM		2	
parameters	symbols	 			
	Aggregation	level	CCE	8	
		othetical PDCCH RE erage SSS RE	dB	4	
	energy	relage 555 INL			
		othetical PDCCH	dB	4	
		gy to average SSS RE	45	·	
	energy				
	DMPS prece	oder granularity		REG bundle size	
DDV	REG bundle	SIZE		6	
DRX Gap pattern ID				OFF an0	
Layer 3 filtering	<u> </u>			gp0 Enabled	
,					
	T310 timer			0	
T311 timer			ms	1000	
N310 N311				1	
CSI-RS configuration for Config 1			CSI-RS.1.1 FDD		
CSI reporting	a attori toi	Config 2		CSI-RS.1.1 TDD	
		Config 3		CSI-RS.2.1 TDD	
CSI-RS for trac	CSI-RS for tracking Config 1			TRS.1.1 FDD	
	Config 2			TRS.1.1 TDD	
	Config 3			TRS.1.2 TDD	
T1			S	0.2	
T2			S	0.48	
T3				0.48	

D1		S	0.44
Note 1:	ote 1: All configurations are assigned to the UE prior to the start of time period T1.		
Note 2: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter			Unit	Test 1		
				T1	T2	Т3
EPRE ra	EPRE ratio of PDCCH DMRS to SSS dB 4					
EPRE ra	tio of PDC	CH to PDCCH DMRS	dB		0	
EPRE ra	tio of PBC	H DMRS to SSS	dB			
EPRE ra	tio of PBC	H to PBCH DMRS	dB			
	tio of PSS		dB			
EPRE ra	tio of PDS	CH DMRS to SSS	dB	0		
EPRE ra	tio of PDS	CH to PDSCH DMRS	dB			
EPRE ra	tio of OCN	IG DMRS to SSS	dB			
EPRE ra	tio of OCN	IG to OCNG DMRS	dB			
SNR on I	RLM-RS	Config 1	dB	1	-7	-15
		Config 2		1	-7	-15
		Config 3		1	-7	-15
SNR on other channels and config 1, 2, 3 dB 1 signals						
			dBm/	-98		
N_{oc}		Config 2	15kH	-98		
Config 3		Z	-98			
N_{oc}						
¹ V _{oc}		Config 2	SCS	-98		
Config 3 -95						
	ion condit	ion			-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 signal contains PDCCH for UEs other than the device under test as part of OCNG.						
Note 3:	·					
Note 4:	Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and			NR2 and		
	SNR3 respectively in Figure A.6.5.1.1.1-1.					
Note 5:		R values are specified for				
least one band. For testing of a UE which supports 4RX on all bands, the				ands, the		
SNR during T3 is A.3.6.						

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 1
		Value
gap	Offset	0
Note:	Ensure that RLM RS is partially overlapped with measurement gap	

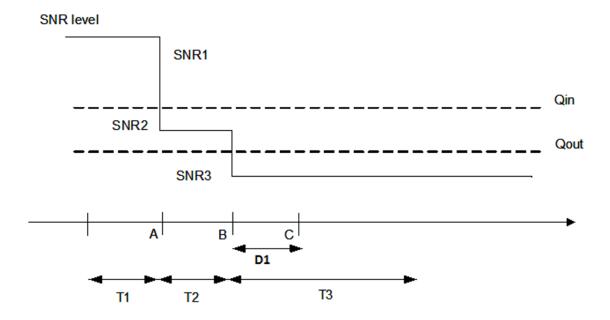


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: 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
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference	Config 1		CR.1.1 FDD
Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz
	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1
	Config 3		Table A.3.8.2.4-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Configuration			2x2 Low
In sync transmission parameters	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	average SSS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
'	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average SSS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

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

Parameter		Unit		Test 1				
			T1	T2	Т3	T4	T5	
EPRE ratio of PDC	CH DMRS to SSS	dB			4			
EPRE ratio of PDC	CH to PDCCH DMRS	dB			0			
EPRE ratio of PBCI	H DMRS to SSS	dB						
EPRE ratio of PBCI	H to PBCH DMRS	dB						
EPRE ratio of PSS	to SSS	dB						
EPRE ratio of PDS0	CH DMRS to SSS	dB			0			
EPRE ratio of PDS0	CH to PDSCH DMRS	dB						
EPRE ratio of OCN	G DMRS to SSS	dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1	
	Config 2		1	-7	-15	-4.5	1	
	Config 3		1	-7	-15	-4.5	1	
SNR on other channels and signals	Config 1, 2, 3	dB	1					
N	Config 1	dBm/			-98			
N_{oc}	Config 2	15	-98					
	Config 3	kHz	-98					
λI	Config 1	dBm/	-98					
N_{oc}	Config 2	SCS			-98			
	Config 3			•	-95		•	
Propagation condition	on		TDL-C 300ns 100Hz					

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

SNR level SNR1 SNR5 Qin SNR2 SNR4 Qout SNR3 A B C D E F D1

Table A.6.5.1.2.1-4: Void

Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

T4

T5

T3

A.6.5.1.2.2 Test Requirements

T1

T2

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, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 2.

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
	is only required to pass in one of the supported test rations in FR1		

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference	Config 1		CR.1.1 FDD
Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1
	Config 3		Table A.3.8.2.4-1
SSB index assigned as	RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols	005	0
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX Configuration			DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD	
for CSI reporting	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
T1		S	0.2	
T2	T2		0.68	
T3		S	0.68	
D1		S	0.64	

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

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

Parameter		Unit				
			T1	T2	T3	
EPRE ratio of PDC	CH DMRS to SSS	dB	4			
EPRE ratio of PDC	CH to PDCCH DMRS	dB		0		
EPRE ratio of PBCI	H DMRS to SSS	dB				
EPRE ratio of PBCI	H to PBCH DMRS	dB				
EPRE ratio of PSS	to SSS	dB		0		
EPRE ratio of PDS	CH DMRS to SSS	dB				
EPRE ratio of PDS	CH to PDSCH DMRS	dB				
EPRE ratio of OCN	G DMRS to SSS	dB				
EPRE ratio of OCN	G to OCNG DMRS	dB				
SNR on RLM-RS	Config 1	dB	1	-7	-15	
	Config 2		1	-7	-15	
	Config 3		1	-7	-15	
SNR on other channels and signals	Config 1, 2, 3	dB	1			
	Config 1	dBm/15		-98		
N_{oc}	Config 2	kHz		-98		
	Config 3		-98			
N	Config 1	dBm/S	-98			
N_{oc}	Config 2	CS		-98		
	Config 3			-95		
Propagation conditi	on		TDL-C 300ns 100Hz			
Note 4: OCNIC abolt he wood such that the recover			N 11 4 6 11			

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.

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.

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

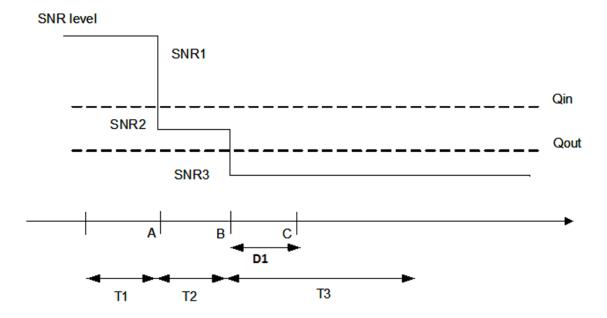


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
	is only required to pass in one of the supported test ations in FR1		

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Para	Parameter		Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration			DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1
configuration			
UL initial BWP configuration	n Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
configuration			
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
CORESET Reference	Config 1		CR.1.1 FDD
Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH subcarrie	• ,		15 kHz
spacing	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1
	Config 3		Table A.3.8.2.4-1
SSB index assigned as RL	M RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Anto	enna Configuration		2x2 Low
	DCI format		1-0
	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration for	Config 1		CSI-RS.1.1 FDD
CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

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	T3	T4	T5
EPRE ratio of PD	OCCH DMRS to SSS	dB			4		
EPRE ratio of PD	OCCH to PDCCH DMRS	dB			0		
EPRE ratio of PB	CH DMRS to SSS	dB					
EPRE ratio of PB	CH to PBCH DMRS	dB					
EPRE ratio of PS	S to SSS	dB			0		
EPRE ratio of PD	SCH DMRS to SSS	dB					
EPRE ratio of PD	SCH to PDSCH DMRS	dB					
EPRE ratio of OC	NG DMRS to SSS	dB					
EPRE ratio of OC	CNG to OCNG DMRS	dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
SNR on other							
channels and	Config 1, 2, 3	dB	1				
signals	-						
N_{oc}	Config 1	dBm/15			-98		
^{IV}oc	Config 2	kHz	-98				
	Config 3		-98				
N	Config 1	dBm/S	-98				
N_{oc}	Config 2	CS	-98				
	Config 3		-95				
Propagation cond	dition			TDL	-C 300ns 1	00Hz	

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.6.5.1.4.1-4: Void Table A.6.5.1.4.1-5: Void

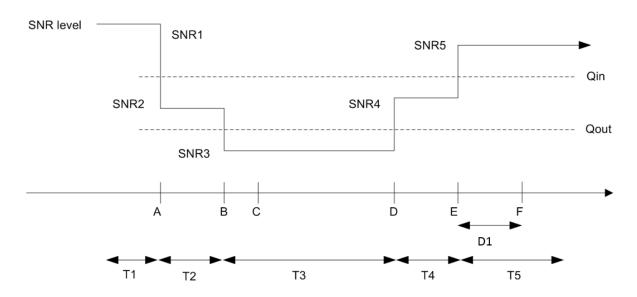


Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

A.6.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

(Configuration	Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth				
Note:	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	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
TDD 0 (' '	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : :: I DIMD	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
OCNG parameters			OP.1
CP length			Normal
	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311	0 5 4		1
	Config 1		CSI-RS.1.1 FDD

CSI-RS configuration	Config 2		CSI-RS.1.1 TDD
for CSI reporting	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit		Test 1	
			T1	T2	T3
PDCCH_be	eta	dB	4		
PDCCH_DI	MRS_beta	dB		4	
PBCH_beta	<u> </u>	dB			
PSS_beta		dB			
SSS_beta		dB		0	
PDSCH_be	eta	dB			
OCNG_bet	a	dB			
SNR	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
0 5 4		dBm/15kHz	-98		
N_{oc}	Config 2		-98 -98		
	Config 3				
Propagation condition			TDL-C 300ns 100Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0
Note 1: Void	

Table A.6.5.1.5.1-4: Void

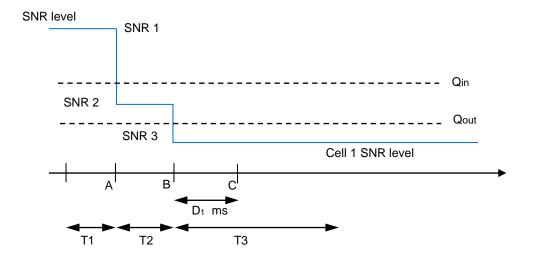


Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.5.2 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 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

	Configuration	Description
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth
3		TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth
Note	: The UE is only re	equired to pass in one of the supported test configurations in FR1

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : W I DIVID	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
PDCCH_b	eta	dB			4		
PDCCH_D	MRS_beta	dB			4		
PBCH_bet	ta	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
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N _{oc} Config 1 Config 2		dBm/15kHz			-98		
					-98		
	Config 3				-98		
Propagation	on condition			TDI	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.6.1-4: Void

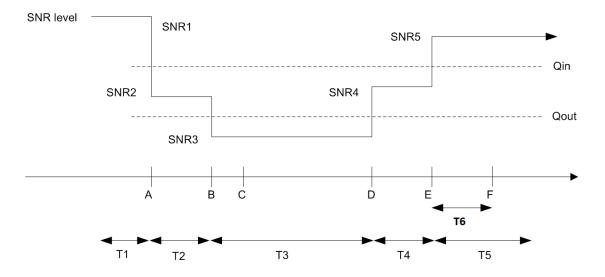


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
•	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
	Config 1		CR.1.1 FDD

0005057	I o	ī	00.44.700	
CORESET Config 2			CR.1.1 TDD	
Reference Channel Config 3			CR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
OMTO O C	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
DD0011/DD0011	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		15 kHz	
. 0	Config 3		30 kHz	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD	
	Config 2		Resource #4 in TRS.1.1 TDD	
	Config 3		Resource #4 in TRS.1.2 TDD	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and	Antenna Configuration		2x2 Low	
Out of sync	DCI format		1-0	
transmission	Number of Control OFDM		2	
parameters	symbols			
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE	dB	4	
	energy to average CSI-RS RE energy			
	Ratio of hypothetical PDCCH	dB	4	
	DMRS energy to average CSI-RS			
	RE energy		DEO harrelle eine	
	DMRS precoder granularity		REG bundle size	
DDV	REG bundle size		6	
DRX Gap pattern ID			DRX.3 N.A.	
Layer 3 filtering T310 timer		mo	Enabled 0	
T311 timer		ms	1000	
N310		ms	1	
N311			1	
CSI-RS configuration Config 1			CSI-RS.1.1 FDD	
for CSI reporting	Config 2		CSI-RS.1.1 TDD	
	Config 3	1	CSI-RS.2.1 TDD	
T1	13	S	0.2	
T2		S	1.28	
T3		S	1.28	
D1		s	1.24	
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	•	

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit		Test 1		
			T1	T2	Т3	
PDCCH_beta		dB	4			
PDCCH_D	MRS_beta	dB		4		
PBCH_bet	ta	dB				
PSS_beta		dB				
SSS_beta		dB	0			
PDSCH_b	eta	dB				
OCNG_be	ta	dB				
SNR	Config 1	dB	1	-7	-15	
	Config 2		1	-7	-15	
	Config 3		1	-7	-15	
N _{oc}	Config 1	dBm/15kHz	-98			
ОС	Config 2		-98 -98			
	Config 3					
Propagation condition			TDL-C 300ns 100Hz			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.7.1-4: Void

Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void

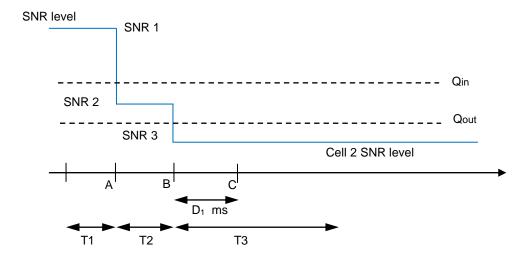


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.7.2 Test Requirements

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

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

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

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : W I DIMD	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1
configuration	Cornig 1, 2, 3		DEBWI .I.I
UL initial BWP	Config 1, 2, 3		ULBWP.0.1
configuration	301g 1, 2, 3		025777.011
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
configuration	3 , ,		
CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
OCNG parameters	1		OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
T4		S	0.2
T5		S	1.88
T6		S	1.84
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
PDCCH_beta		dB		4			
PDCCH_E	DMRS_beta	dB			4		
PBCH_bet	ta	dB					
PSS_beta		dB					
SSS_beta		dB	0				
PDSCH_b	eta	dB					
OCNG_be	eta	dB					
SNR	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
λ/ Config 1		dBm/15kHz	-98				
N_{oc} Config 1 Config 2			-98				
Config 3			-98				
Propagation	on condition			TD	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 1
	Value	
	gapOffset	0
Note 1:	Void	

Table A.6.5.1.8.1-4: Void Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

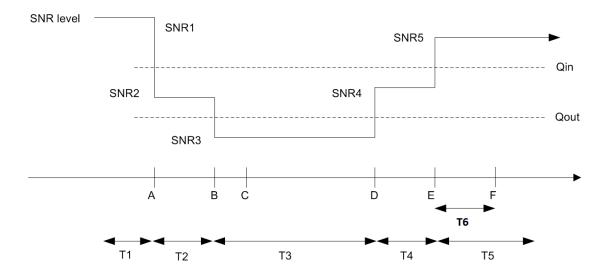


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2 Interruption

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.6.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2 and A 6.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode	
3		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode	
4		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode	
5		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD – TDD duplex mode	
Note:	The UE is onl	y required to be tested in one of the supported test configurations	

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parame	ter	Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode	Config 1		FDD	FDD
	Config 2,5		TDD	TDD
	Confiq 3		TDD	FDD
	Confiq 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Confiq 4		Not Applicable	TDDConf.1.1
	Confiq 5		TDDConf.1.2	TDDConf.1.2
BW _{channel}	Config 1,2,3,4		10 MHz: N _{RB,c} = 52	10 MHz: N _{RB,c} = 52
	Config 5		40 MHz: N _{RB,c} = 106	40 MHz: N _{RB,c} = 106
Initial BWP			DLBWP.0).2 ^{Note6}
Configuration				
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Confiq 4		SR.1.1 FDD	SR.1.1 TDD
	Confiq 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Confiq 4		CR.1.1 FDD	CR.1.1 TDD
	Confiq 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3		CCR.1.1 TDD	CCR.1.1 FDD

	Config 4		CCR.1.1 FDD	CCR.1.1 TDD	
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD	
OCNG Patterns			OP.1	OP.1	
SMTC Configuration			SMTC.1	SMTC.1	
SSB Configuration	Config 1,2,3,4		SSB.1 FR1	SSB.1 FR1	
_	Config 5		SSB.2 FR1	SSB.2 FR1	
Correlation Matrix and A	Antenna		1x2 Low	1x2 Low	
Configuration					
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMR					
EPRE ratio of PBCH to PB					
EPRE ratio of PDCCH DM		_			
EPRE ratio of PDCCH to P		dB	0	0	
EPRE ratio of PDSCH DM		_			
EPRE ratio of PDSCH to P		_			
EPRE ratio of OCNG DMR					
EPRE ratio of OCNG to OC	CNG DMRS (Note 1)				
Noc ^{Note 2}		dBm/15	[-104]	[-104]	
OO DODD Note 3		kHz	<u> </u>		
SS-RSRP Note 3		dBm/15	[-87]	[-87]	
		kHz			
Ês/lot		dB	17	17	
Ês/Noc		dB	17	17	
N _{oc} Note 2	Config 1,2,3,4	dBm/S	[-104]	[-104]	
Config 5			[-101]	[-101]	
Io ^{Note3}	Config 1,2,3,4	dBm/ 9.36MHz	[-59]	[-59]	
	Config 5	dBm/ 38.16MHz	[-61.9]	[-61.9]	
Time offset to Cell1 Note 5		μS	-	3	
Propagation Condition			AWGN	AWGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Void
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3].

A.6.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on PCell shall not exceed the value defined in Table A.6.5.2.1.2-1 if the PCell is not in the same band as the deactivated SCell or Table A.6.5.2.1.2-2 if the PCell is in the same band as the deactivated SCell.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3 SCell Activation and Deactivation Delay

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $(n+T_{HARQ}+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in clause 8.3.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3, and any PCell interruption due to the deactivation shall occur in the slot $(n+1+[T_{HARQ}+3ms])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
CQI/PMI periodicity and offset configuration index		0	CQI reporting for SCell every second subframe
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μS	0	
Time alignment error between cell2 and cell1	μS	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	1	During this time the UE shall activate the SCell.
Т3	S	1	During this time the UE shall deactivate the SCell.
THARQ	slot	k	k is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by <i>dl-DataToUL-ACK</i> , the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
TCSI_Reporting	ms	2	the delay uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]

Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	T1		T2		T3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Dupley made	Config 1		FDD TDD					
Duplex mode	Config 2,3						•	

TDD configuration Config 1 Config 2 Config 3			Not applicable					
		_	TDDConf.1.1 TDDConf.1.2					
	Config 1,2	MHz						
BW _{channel}	Config 3		10: N _{RB,c} = 52 40: N _{RB,c} = 106					
			10.14(0,0 = 100					
Initial BWP configuration	ו			DLBWP.0.2				
TCI state					TCI.S	tate.0		
TRS Configuration					TRS.1.	1 TDD		
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET parameters	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET parameters	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
OCNG Patterns			OP.1					
	Config 1,2				SSB.			
Cob comigaration (Config 3		SSB.2 FR1					
SMTC configuration			SMTC.1					
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PB								
EPRE ratio of PDCCH DMI		1						
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0					
EPRE ratio of PDSCH DMI	RS to SSS	1						
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)		4						
EPRE ratio of OCNG DIVIRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		1						
$N_{oc}^{ m Note2}$	Config 1,2,4,5	dBm/15kHz	-104					
Config 3,6		UDIII/ IOKEZ	-101					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	17					
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		17					
SS-RSRP ^{Note3} Config 1,2,4,5 Config 3,6		dBm/SCS	-87 -84					

SCH_RP Note 3		dBm/15 kHz	-87	
Propagation condition		-	AWGN	
Note 1: OCNG shall be used such that bot density is achieved for all OFDM s			allocated and a constant total transmitted power spectral	
Note 2: Interference from other cells and n			of specified in the test is assumed to be constant over N_{oc} to be fulfilled.	
Note 3:	Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. The are not settable parameters themselves.			
Note 4: The uplink resources for CSI report		rting are assigne	ed to the UE prior to the start of time period T2.	

A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in a slot ($n+T_{HARQ}+3$ ms).

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, $T_{activation_time}=[5 \text{ ms}+T_{SMTC_SCell}]$, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot ($n+[T_{HARQ}+3ms]$), as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $(n+1+[T_{HARQ}])$ to $(n+1+[T_{HARQ}+3ms+T_{SSB_max}+T_{SMTC_duration}])$, as defined in clause 8.3.

During T3 interruption of PCell / PSCell during SCell deactivation shall not happen outside the slot $(n+1+[T_{HARQ}])$ to $(m+1+[T_{HARO}+3ms])$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot (n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting}) as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell measurement cycle

A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.6.5.3.2.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $[T_{SMTC_MAX} + T_{SMTC_SCell} + 5ms]$.

A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.1.1-1. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $(n+T_{HARQ}+T_{activation_time}+T_{CSI_Reporting})$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $(n+T_{HARQ}+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}]+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}]+3ms)$ to $(n+1+[T_{HARQ}]+3ms)$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $(n+[T_{HARQ}+3ms])$, as defined in clause 8.3, and any PCell interruption due to the deactivation shall occur in the slot $(n+1+[T_{HARQ}+3ms])$ to $(n+1+[T_{HARQ}+3ms])$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.6.5.3.3.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [5 ms+2* T_{SMTC_MAX} +2* T_{SMTC_SCell}] as defined in clause 8.3.

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4: Void

A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, 10 MHz bandwidth, SUL duplex mode

9		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, 40 MHz bandwidth, SUL duplex mode			
N	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test	Value	Comment
		configuration		
RF Channel		Config 1,2,3, 4,	1, 2	Three radio channels are used for these
Number		5, 6, 7, 8, 9		two tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	E-UTRAN PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement		Config 1,2,3, 4,	OFF	
gap pattern Id		5, 6, 7, 8, 9		
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		
T1	_	Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Parameter	Unit	Test	Test 1			Test 2											
		Configuration	T1 T2	T3	T1	T2	Т3										
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	2			2											
		Conf 1, 2, 3	N/A			N/A											
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1		TDD Conf.1.1												
		Conf 7, 8, 9	TDD Conf.2.1			D Conf.2.1											
		Conf 1, 2, 3	10: N _{RB,c} = 52	10: $N_{RB,c} = 52$		$N_{RB,c} = 52$											
BW _{channel}	MHz	Conf 4, 5, 6	10: N _{RB,c} = 52			$N_{RB,c} = 52$											
		Conf 7, 8, 9	40: N _{RB,c} = 106		40:	$N_{RB,c} = 106$	3										
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD			R.1.1 FDD											
measurement		Conf 4, 5, 6	SR.1.1 TDD		SF	R.1.1 TDD											
channel as defined in A.3.1.1		Conf 7, 8, 9	SR 2.1 TDD			R 2.1 TDD											
RMSI CORESET		Conf 1, 2, 3	CR.1.1 FDD			R.1.1 FDD											
reference		Conf 4, 5, 6	CR.1.1 TDD		CF	R.1.1 TDD											
measurement channel as defined in A.3.1.2		Conf 7, 8, 9	CR.2.1 TDD		CF	R.2.1 TDD											
RMC CORESET		Conf 1, 2, 3	CCR.1.1 FDD		CC	R.1.1 FDD											
reference		Conf 4, 5, 6	CCR.1.1 TDD			R.1.1 TDD											
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	CCR.2.1 TDD												CCR.2.1 TDD		1
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	OP.1		OP.1		OP.1		OP.1 OP.1		OP.1						
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1		SSB.1 FR1												
, and the second		Conf 7, 8, 9	SSB.2 FR1	SSB.2 F		SB.2 FR1											
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9			SMTC.1												
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1		DLBWP.0.1		DLBWP.0.1 DLBWP.		_BWP.0.1								
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1		DLBWP.1.1												
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1		UI	_BWP.1.1											
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS																	
EPRE ratio of PBCH to PBCH_DMRS																	
EPRE ratio of PDCCH_DMRS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0			0											
EPRE ratio of PDCCH to PDCCH_DMRS		3, 0, 7, 0, 9															
EPRE ratio of PDSCH_DMRS to SSS																	
EPRE ratio of PDSCH to PDSCH_DMRS																	

EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102	
N_{oc} Note 2	dBm/ SCS	Conf 1,2,3,4,5,6		-102			-102	
	303	Conf 7,8,9		-99			-99	
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
		Conf 7,8,9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
10	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

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter				Test 2				
		Configuration	T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		3			3	
		Conf 1, 4, 7		N/A		N/A		
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
Ü		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1	
		Conf 1, 4, 7		10: N _{RB,c} = 5	52		10: N _{RB,c} = 52	
BW _{channel}	MHz	Conf 2, 5, 8		10: N _{RB,c} = 5	52		10: N _{RB,c} = 52	
		Conf 3, 6, 9	4	40: N _{RB,c} = 1		4	40: $N_{RB,c} = 100$	6
		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		G-FR1-	
			FR1- A3-3 in [13]	A3-3 in [13]	A3-3 in [13]	N/A	A3-3 in [13]	N/A
		Conf 2, 5, 8	G-	G-FR1-	G-FR1-			
PUSCH parameters for NR UL carrier		OOM 2, 3, 0	FR1- A3-3 in [13]	A3-3 in [13]	A3-3 in [13]	N/A	G-FR1- A3-3 in [13]	N/A
		Conf 3, 6, 9	G- FR1- A3-7 in [13]	G-FR1- A3-7 in [13]	G-FR1- A3-7 in [13]	N/A	G-FR1- A3-7 in [13]	N/A
		Conf 1, 4, 7	Table 8.3.3.1 .2-1 in [13]	Table 8.3.3.1. 2-1 in [13]	Table 8.3.3.1.2 -1 in [13]	N/A	N/A	N/A
PUCCH parameters For NR UL carrier		Conf 2, 5, 8	Table 8.3.3.1 .2-1 in [13]	Table 8.3.3.1. 2-1 in [13]	Table 8.3.3.1.2 -1 in [13]	N/A	N/A	N/A
		Conf 3, 6, 9	Table 8.3.3.1 .2-2 in [13]	Table 8.3.3.1. 2-2 in [13]	Table 8.3.3.1.2 -2 in [13]	N/A	N/A	N/A
		Conf 1, 4, 7	N/A	G-FR1- A3-3 in [13]	N/A	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]
PUSCH parameters for supplementary UL		Conf 2, 5, 8	N/A	G-FR1- A3-3 in [13]	N/A	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]	G-FR1- A3-3 in [13]
		Conf 3, 6, 9	N/A	G-FR1- A3-7 in [13]	N/A	G-FR1- A3-7 in [13]	G-FR1- A3-7 in [13]	G-FR1- A3-7 in [13]
		Conf 1, 4, 7	N/A	N/A	N/A	Table 8.3.3.1.2 -1 in [13]	Table 8.3.3.1.2 -1 in [13]	Table 8.3.3.1.2 -1 in [13]
PUCCH parameters for supplementary UL		Conf 2, 5, 8	N/A	N/A	N/A	Table 8.3.3.1.2 -1 in [13]	Table 8.3.3.1.2 -1 in [13]	Table 8.3.3.1.2 -1 in [13]
		Conf 3, 6, 9	N/A	N/A	N/A	Table 8.3.3.1.2 -2 in [13]	Table 8.3.3.1.2 -2 in [13]	Table 8.3.3.1.2 -2 in [13]
PDSCH reference		Conf 1, 4, 7		SR.1.1 FD			SR.1.1 FDD	1
measurement channel as defined		Conf 2, 5, 8 Conf 3, 6, 9		SR.1.1 TD			SR.1.1 TDD	
in A.3.1.1				SR 2.1 TD			SR 2.1 TDD	
		Conf 1, 4, 7		CR.1.1 FD	ט		CR.1.1 FDD	1

DMCLCODECET		010-5		OD 4 4 TD			OD 4 4 TDD		
RMSI CORESET reference		Conf 2, 5, 8		CR.1.1 TDI)	CR.1.1 TDD			
measurement		Conf 3, 6, 9							
channel as defined				CR.2.1 TDI)		CR.2.1 TDD)	
in A.3.1.2 RMC CORESET		Conf 1, 4, 7		CR.1.1 FD	ח	_	CR.1.1 FDI	`	
reference measurement		Conf 2, 5, 8		CR.1.1 TD	טי		CR.1.1 TDI)	
		Conf 3, 6, 9	,	OD 0 4 TD	.D	_	CD 0 4 TD	_	
channel as defined			(CR.2.1 TD	טי		CR.2.1 TDI	J	
in A.3.1.3 OCNG Pattern Note 1		Conf 1 2 2		OP.1			OD 1		
OCNG Pattern		Conf 1, 2, 3		UP.1			OP.1		
000 " "		Conf 1, 2, 4, 5,		SSB.1 FR1	1		SSB.1 FR1		
SSB configuration		7,8		000 0 50	<u> </u>		00D 0 ED4		
		Conf 3, 6, 9		SSB.2 FR1			SSB.2 FR1		
SMTC configuration		Conf 1, 2, 3, 4,		SMTC.1			SMTC.1		
		5, 6, 7, 8, 9							
DL initial BWP		Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1		
configuration		5, 6, 7, 8, 9							
DL dedicated BWP		Conf 1, 2, 3, 4,		DLBWP.1.	1		DLBWP.1.1		
configuration		5, 6, 7, 8, 9							
UL dedicated BWP		Conf 1, 2, 3, 4,		ULBWP.1.	1		ULBWP.1.1		
configuration	ļ	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							ļ		
SSS									
EPRE ratio of									
PDCCH to		Conf 1 2 2 4							
PDCCH_DMRS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		0			0		
EPRE ratio of		5, 6, 7, 6, 9							
PDSCH_DMRS to									
SSS									
EPRE ratio of									
PDSCH to									
PDSCH_DMRS									
EPRE ratio of									
OCNG DMRS to									
SSS									
EPRE ratio of									
OCNG to OCNG									
DMRS									
	dBm /	Conf 1, 2, 3, 4,		4			4.5.5		
	15kHz	5, 6, 7, 8, 9		-102			-102		
M		Conf 1, 2, 4, 5,	onf 1 2 1 5						
N_{oc} Note 2	dBm/ 7.8 -102			-102					
	SCS	Conf 3, 6, 9	-99			-99			
A /37		Conf 1, 2, 3, 4,							
\hat{E}_s/N_{oc}	dB	5, 6, 7, 8, 9	16	16	16	16	16	16	
		Conf 1, 2, 3, 4,							
\hat{E}_s/I_{ot} Note 3	dB		16	16	16	16	16	16	
37 00		5, 6, 7, 8, 9 Conf 1, 2, 4, 5,							
SS_RSRD Note 3	dBm/		-86	-86	-86	-86	-86	-86	
SS-RSRP Note 3	dBm/ SCS	7,8 Conf 3, 6, 9	-86 -83	-86 -83	-86 -83	-86 -83	-86	-86 -83	

IO Note 3	dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	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.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.6.5.4.2 Void

A.6.5.5 Beam Failure Detection and Link recovery procedures

A.6.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.6.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.1.1-1, A.6.5.5.1.1-2, A.6.5.5.1.1-3 and A.6.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of

the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.6.5.5.1.1-1: Supported test configurations for FR1 PCell

Cor	nfiguration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
1	Config 2, 3		TDD	
BWchannel	Config 1	MHz	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
-	Config 2		TDDConf.1.1	
	Config 3		TDDConf.1.2	
CORESET Reference Channel	Config 1		CR. 1.1 FDD	
	Config 2		CR. 1.1 TDD	
	Config 3		CR. 2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier	Config 1, 2		15 KHz	
spacing	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1	
	Config 3		Table A.3.8.2.4-1	
SSB Index assigned as BFD RS			0	
SSB Index assigned as CBD RS	(q ₁)		1	
OCNG parameters			OP.1	

CP length		1	Normal	
Correlation Matrix and Ant	enna Configuration		2x2 Low	
	erina Corniguration		ZXZ LUW	
Beam failure detection	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			gp0	
rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used for Qout_LR_SSB
powerControlOffsetSS	powerControlOffsetSS		db0	Used for deriving rsrp- ThresholdCSI-RS
beamFailureInstanceMaxC	Count		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTime	er		pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for	Config 1		[CSI-RS.1.1 FDD]	
CSI reporting	Config 2		[CSI-RS.1.1 TDD]	
	Config 3		[CSI-RS.2.3 TDD]	
CSI-RS for tracking	Config 1		[TRS.1.1 FDD]	
	Config 2		[TRS.1.1 TDD]	
	Config 3		[TRS.1.2 TDD]	
SSB Index assigned as		0, 1		
RLM RS		1000		
T310 Timer	ms	1000		
N310		2		b
T1		S	0.2	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.37	
T3		S	0.24	
T4		S	0	
T5		S	0.17	
D1		S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.6.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

	Parameter	Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of	PDCCH DMRS to SSS	dB		•			
EPRE ratio of	PDCCH to PDCCH DMRS	dB					
EPRE ratio of	PBCH DMRS to SSS	dB					
EPRE ratio of	PBCH to PBCH DMRS	dB					
EPRE ratio of	PSS to SSS	dB			0		
EPRE ratio of	PDSCH DMRS to SSS	dB					
EPRE ratio of	PDSCH to PDSCH DMRS	dB					
EPRE ratio of	OCNG DMRS to SSS	dB					
EPRE ratio of	OCNG to OCNG DMRS	dB					
SNR_SSB of	Config 1	dB	5	-3	-12	-12	-12
set q ₀	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of	Config 1		-12	-12	5	5	5
set q ₁	Config 2	dB	-12	-12	5	5	5
Set q1	Config 3		-12	-12	5	5	5
N	Config 1	dBm/15			-98		
N_{oc}	Config 2	KHz			-98		
	Config 3				-98		
Propagation c	ondition		TDL-C 300ns 100Hz				
Note 1: OC	NG shall be used such that the	e resources	in Cell 1 a	re fully allo	cated and a	constant to	otal
	nsmitted power spectral density						
Note 2: The uplink resources for CSI reporting are assigned to							
	SI reporting	g are assigı	ned to the U	JE prior to t	he start		
of time period T1.							
	asurement gap configuration is						
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time p				period			

- T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 Note 8: respectively in figure A.4.5.5.1.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 9: testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

Table A.6.5.5.1.1-4: Measurement gap configuration for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field	Test 1
rieid	Value
gapOffset	0

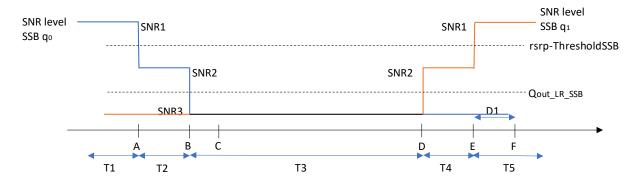


Figure A.6.5.5.1.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = [120+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the

period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Config	guration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
			0 " 1	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
BWchannel	Config 2, 3 Config 1	MHz	TDD 10: NRB,c = 52	
Byvchannei	Config 1	IVIHZ	10: NRB,C = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1	
TDD Configuration	Config 1		Not Applicable	
· ·	Config 2		TDDConf.1.1	
	Config 3		TDDConf.1.2	
CORESET Reference	Config 1		CR. 1.1 FDD	
Channel	Config 2		CR. 1.1 TDD	
	Config 3		CR. 2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH subcarrier	Config 1, 2		15 KHz	
spacing	Config 3		30 KHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.4-1	_
	Config 3		Table A.3.8.2.4-1	
SSB Index assigned as BFD			0	
SSB Index assigned as CBD	RS (q ₁)		1	
OCNG parameters			OP.1	

CP length			Normal	
Correlation Matrix and Antenna			2x2 Low	
Configuration	7 tittoriila		ZXZ ZOW	
Beam failure	DCI format		1-0	
detection	Number of Control		2	
transmission	OFDM symbols		_	
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	0	
	PDCCH RE energy			
	to average CSI-RS			
	RE energy			
	Ratio of hypothetical	dB	0	
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
rlmInSyncOutOfSyncT	hreshold		Absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-
Thursday Idean		al Duna	00	1). Threshold used
rsrp-ThresholdSSB		dBm	-98	for Q _{out_LR_SSB}
powerControlOffsetSS			db0	Used for deriving
powerControlOnsetSS			ub0	rsrp-
				ThresholdCSI-
				RS
beamFailureInstanceM	laxCount		n1	see clause 5.17
				of TS 38.321 [7]
beamFailureDetection ⁻	Timer		pbfd4	see clause 5.17
				of TS 38.321 [7]
CSI-RS configuration	Config 1, 4		[CSI-RS.1.1 FDD]	
for CSI reporting				
	Config 2, 5		[CSI-RS.1.1 TDD]	
	Config 3, 6		[CSI-RS.2.1 TDD]	
CSI-RS for tracking	Config 1, 4		[TRS.1.1 FDD]	
	Config 2, 5		[TRS.1.1 TDD]	
	Config 3, 6		[TRS.1.2 TDD]	
SSB Index assigned		0, 1		
as RLM RS		4000		
T310 Timer	ms	1000		
N310 T1		2	1	During this time
		S	'	During this time the the UE shall
				be fully
				synchronized to
				cell 1
T2		s	5.17	
T3		S	3.24	
T4		S	0	
T5		S	1.97	_
D1		S	1.93	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.6.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of	PDCCH DMRS to SSS	dB					
EPRE ratio of	PDCCH to PDCCH DMRS	dB					
EPRE ratio of	PBCH DMRS to SSS	dB					
EPRE ratio of	PBCH to PBCH DMRS	dB					
EPRE ratio of	PSS to SSS	dB			0		
EPRE ratio of	PDSCH DMRS to SSS	dB					
EPRE ratio of	PDSCH to PDSCH DMRS	dB					
EPRE ratio of	OCNG DMRS to SSS	dB					
EPRE ratio of	OCNG to OCNG DMRS	dB					
SNR_SSB of	Config 1		5	-3	-12	-12	-12
set q ₀	Config 2	dB	5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of	Config 1		-12	-12	5	5	5
set q ₁	Config 2	dB	-12	-12	5	5	5
Set 41	Config 3		-12	-12	5	5	5
N Config 1		dBm/15	-98			•	
N _{oc} Config 1		KHz	-98				
Config 3			-98				•
Propagation c	ropagation condition TDL-C 300ns 100Hz						

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

Table A.6.5.5.2.1-4: Void

Table A.6.5.5.2.1-5: Void

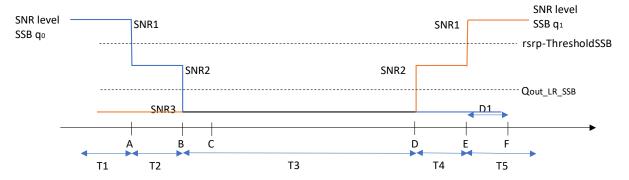


Figure A.6.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.6.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.3.1-1, A.6.5.5.3.1-2, and below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Cor	onfiguration Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value Test 1	Comment
			1000	
Active PCell			Cell 1	
RF Channel Nu	mber		1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf.1.2	
CORESET	Config 1		CR.1.1 FDD	A.3.1.2
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
SSB	Config 1		SSB.1 FR1	A.3.10
Configuration	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	7.1.01.1.
PDSCH/PDC	Config 1, 2		15 KHz	
CH subcarrier	•			
spacing	Config 3		30 KHz	
	signed as beam		0	
failure detection	RS in set q ₀			
OCNG paramet	ers		OP.1	A.3.2.1
CP length	CP length		Normal	
Correlation Mat	rix and Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection transmission	Number of Control OFDM symbols		2	
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			N.A.	
	ssigned as candidate		1	N

rlmInSyncOutOfSyncThreshold			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	-98	Threshold used for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxC	Count		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTime	er		pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for	Config 1		CSI-RS.1.2 FDD	A.3.14
q₀ and q₁	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS configuration for	Config 1		CSI-RS.1.1 FDD	A.3.14
CSI reporting	Config 2		CSI-RS.1.1 TDD	1
	Config 3		CSI-RS.2.1 TDD	1
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned	Config 1		CSI-RS.1.2 FDD	A.3.14
as RLM RS	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	1
T310 Timer		ms	1000	
N310			2	
T1		S	0.2	During this time the the UE shall be fully synchronized to cell 1
T2		S	0.18	
T3		S	0.14	
T4		S	0	
T5		S	0.08	
D1		S	0.04	
Note 1: UE-specific PD	CCH is not tra	ansmitted aft	er T1 starts.	

Table A.6.5.5.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDC	CH DMRS to SSS	dB					
EPRE ratio of PDC	CH to PDCCH DMRS	dB					
EPRE ratio of PBCI	H DMRS to SSS	dB					
EPRE ratio of PBCI	H to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB			0		
EPRE ratio of PDS	CH DMRS to SSS	dB					
EPRE ratio of PDS	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	G DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of	Config 1		5	-3	-12	-12	-12
set q ₀	Config 2	dB	5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12

			_	1					
SNR_CS	Config 1			-12	-12	5	5	5	
_	1-13 01	Config 2	dB	-12	-12	5	5	5	
set q ₁		Config 3		-12	-12	5	5	5	
λI		Config 1	dBm/15			-98			
N_{oc}		Config 2	KHz			-98			
		Config 3			-98				
Propagat	ion conditi	on			TDL-	C 300ns 10	00Hz		
Note 1:	OCNG s	hall be used such that th	e resources	in Cell 1 a	re fully alloc	ated and a	constant to	otal	
	transmitt	ed power spectral densi	ty is achieve	ed for all OF	DM symbo	ls.			
Note 2:	The upling	nk resources for CSI rep	orting are as	signed to t	he UE prior	to the star	t of time pe	riod T1.	
Note 3:	NZP ĊSI	-RS resource set config	uration for C	SI reportin	g are assigr	ned to the U	JE prior to	the start	
	of time p	eriod T1.		·	•				
Note 4:	Measure	ment gap configuration i	s assigned	to the UE p	rior to the s	tart of time	period T1.		
Note 5:	The time	rs and layer 3 filtering re	lated param	eters are c	onfigured p	rior to the s	tart 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:		R values are specified for		E which su	pports 2RX	on at least	one band.	For	
1									

Table A.6.5.5.3.1-4: Void

testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in

Table A.6.5.5.3.1-5: Void

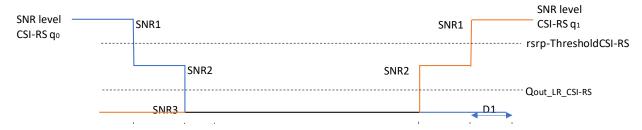


Figure A.6.5.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.3.2 Test Requirements

section [A.3.6].

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [30+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.4.1-1, A.6.5.5.4.1-2, A.6.5.5.4.1-3, and A.6.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
A-tion DO-II			0-114	
Active PCell			Cell 1	
RF Channel Num			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf.1.2	
CORESET	Config 1		CR.1.1 FDD	A.3.1.2
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
SSB	Config 1		SSB.1 FR1	A.3.10
Configuration	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	
PDSCH/PDCC	Config 1, 2		15 KHz	
H subcarrier spacing	Config 3		30 KHz	
csi-RS-Index assigned as beam failure detection RS in set q ₀			[0]	

OCNG parameter	'S		OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix	and Antenna		2x2 Low	
Configuration	t and / intornia		2/12 2011	
Beam failure	DCI format		1-0	
detection	Number of Control		2	
transmission	OFDM symbols		_	
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	0	
	PDCCH RE energy to	u.b	Ŭ	
	average CSI-RS RE			
	energy			
	Ratio of hypothetical	dB	0	
	PDCCH DMRS	u.b	Ŭ	
	energy to average			
	CSI-RS RE energy			
	DMRS precoder		REG bundle size	
	granularity		TALO BUTTUTO 0120	
	REG bundle size		6	
DRX	TCO Barraio Gizo		DRX.7	A.3.3.7
Gap pattern ID			N.A.	71.0.0.7
	igned as candidate		1	
beam detection R			'	
rlmInSyncOutOfS			absent	When the field is
	,			absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-ThresholdSS	B	dBm	-98	Threshold used for
•				$Q_{in_LR_SSB}$
powerControlOffs	etSS		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInsta	nceMaxCount		n1	see clause 5.17 of
				TS 38.321 [7]
beamFailureDete	ctionTimer		pbfd4	see clause 5.17 of
	1			TS 38.321 [7]
CSI-RS	Config 1		CSI-RS.1.2 FDD	A.3.14
configuration for	Config 2		CSI-RS.1.2 TDD	.1
q ₀ and q ₁	Config 3		CSI-RS.2.2 TDD	
CSI-RS	Config 1		CSI-RS.1.1 FDD	A.3.14.1
configuration for	Config 2		CSI-RS.1.1 TDD	
CSI reporting	Config 3		CSI-RS.2.1 TDD	
TRS	Config 1		TRS.1.1 FDD	
configuration	Config 2		TRS.1.1 TDD	
001.00	Config 3		TRS.1.2 TDD	
CSI-RS-Index	Config 1	1	CSI-RS.1.2 FDD	1
assigned as	Config 2	1	CSI-RS.1.2 TDD	1
RLM RS	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	5
T1		S	1	During this time the
				the UE shall be
				fully synchronized
To			0.07	to cell 1
T2		S	8.37	
T3 T4		S	6.44 0	
		S	-	
T5		S	1.97	
D1 Note 1: UE-spe	ecific PDCCH is not transi	S mitted afte	1.93]
NOTE I. UE-SPE		mileu aile	ו וו אמונא.	

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

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMF	RS to SSS	dB					
EPRE ratio of PDCCH to P	DCCH DMRS	dB					
EPRE ratio of PBCH DMRS	S to SSS	dB					
EPRE ratio of PBCH to PB	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB			0		
EPRE ratio of PDSCH DMF	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to OC	NG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1		5	-3	-12	-12	-12
	Config 2	dB	5	-3	-12	-12	-12
	Config 3	7	5	-3	-12	-12	-12
	Config 1		-12	-12	5	5	5
SNR_CSI-RS of set q ₁	Config 2	dB	-12	-12	5	5	5
	Config 3	7	-12	-12	5	5	5
N Config 1		dBm/15	-98				
N_{oc}	Config 2	KHz			-98		
	Config 3				-98		
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

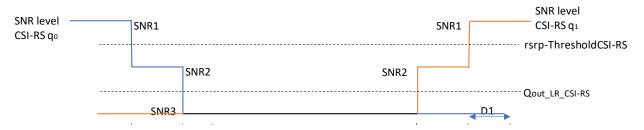


Figure A.6.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.6.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [1920+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6 Active BWP switch

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.6.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters is specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD -FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – TDD duplex mode
3	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD – FDD duplex mode
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD – TDD duplex mode
5	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD - TDD duplex mode
Note 1:	The UE is only required to be tested in one of the supported test configurations

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		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	FR1
Duplex mode	Config 1		FDD	FDD
-	Config 2,5		TDD	TDD
	Config 3		TDD	FDD
	Config 4	1	FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Config 4		Not Applicable	TDDConf.1.1
	Config 5		TDDConf.1.2	TDDConf.1.2
BW _{channel}	Config 1,2,3,4		10 MHz: N _{RB,c} = 52	10 MHz: N _{RB,c} = 52
	Config 5		40 MHz: N _{RB,c} = 106	40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2	3
Initial BWP Configuration	Initial BWP Configuration		DLBWF	0.2 ^{Note4}
Active BWP-1 Configura	tion		DLBWP.1.1 ^{Note4}	-
Active BWP-2 Configura	tion		DLBWP.1.3 ^{Note4}	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD	SR.1.1 TDD
	Config 3		SR.1.1 TDD	SR.1.1 FDD
	Config 4		SR.1.1 FDD	SR.1.1 TDD
	Config 5		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD	CR.1.1 TDD
	Config 3		CR.1.1 TDD	CR.1.1 FDD
	Config 4		CR.1.1 FDD	CR.1.1 TDD
	Config 5		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3]	CCR.1.1 TDD	CCR.1.1 FDD
	Config 4]	CCR.1.1 FDD	CCR.1.1 TDD
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD
OCNG Patterns	T:		OF	
SSB Configuration	Config 1,2,3,4	1	SSB.1 FR1	
	Config 5		SSB.:	2 FR1

SMTC Configuration			SMTC.1	
Correlation Matrix and Antenna			1x2	Low
Configuration				
EPRE ratio of PSS to		dB		
EPRE ratio of PBCH	DMRS to SSS			
EPRE ratio of PBCH t	to PBCH DMRS			
EPRE ratio of PDCCH	H DMRS to SSS			
EPRE ratio of PDCCH	H to PDCCH DMRS			
EPRE ratio of PDSCH	H DMRS to SSS		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)	_			
Noc ^{Note 2}	Config 1,2,3,4	dBm/SCS	[-104	[-104
	Config 5		[-110	[-110
N _{oc} Note 2		dBm/15KH	[-104	[-104
		Z		
SS-RSRP Note 3	Config 1,2,3,4	dBm/SCS	[-87	[-87
	Config 5		[-90	[-90
Ê _s /I _{ot}		dB	[17	[17
Ê _s /N _{oc}		dB	[17	[17
Io ^{Note3} Config 1,2,3,4		dBm/ 9.36MHz	[-59	[-59
	Config 5	dBm/ 38.16MHz	[-61.9	[-61.9
Propagation Condition			AWGN	AWGN
Note 1: OCNG sha density is a	Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			

A.6.5.6.1.1.2 Test Requirements

TS 38.213 [3].

settable parameters themselves.

Note 3

Note 4:

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not

For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2;

DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.6.5.6.1.2.1-1.

The test scenario comprises of one NR cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the NR cell are specified in Table A.6.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a bwp-InactivityTimer timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell1's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell1's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell1's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.6.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is only required to be tested in one of the supported test configurations.		
Note 2:	A UE which fulfils the requirements in test case A.6.5.6.1.1 can skip the test cases in A.4.5.6.1.2.		

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	[200]	
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parame	ter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.1.2
BW _{channel}	Config 1		10 MHz: N _{RB,c} = 52
	Config 2		10 MHz: N _{RB,c} = 52
	Config 3		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP	Config 1,2,3		
Configuration	Corning 1,2,3		DLBWP.0.2 Note 4
Active DL BWP-1	Config 1,2,3		
Configuration	Corning 1,2,3		DLBWP.1.1 Note 4
Active DL BWP-2	Config 1,2,3		
Configuration	Coming 1,2,3		DLBWP.1.3 Note 4
Initial UL BWP	Config 1,2,3		N
Configuration	001111g 1,2,0		ULBWP.0.2 Note 4
Active UL BWP-1	Config 1,2,3		Luciano de Nota d
Configuration	001.11g 1,2,0		ULBWP.1.1 Note 4
Active UL BWP-2	Config 1,2,3		The same of the same of
Configuration			ULBWP.1.3 Note 4
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2	_	SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET	Config 1	_	CR.1.1 FDD
parameters	Config 2	_	CR.1.1 TDD
- H + 1005=5==	Config 3	ļ	CR.2.1 TDD
Dedicated CORESET	Config 1	_	CCR.1.1 FDD
parameters	Config 2	_	CCR.1.1 TDD
	Config 3		CCR.2.1 TDD

OCNG Patterns				OP.1
SSB Configuration Config 1,2		Config 1,2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Configurat	SMTC Configuration			SMTC.1
Correlation Matrix		ntenna		1x2 Low
Configuration				
TRS Configuratio	n	Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
		Config 3,6		TRS.1.2 TDD
EPRE ratio of PS	S to SS	S	dB	0
EPRE ratio of PB	CH DM	RS to SSS		
EPRE ratio of PB				
EPRE ratio of PD				
EPRE ratio of PD				
EPRE ratio of PD				
EPRE ratio of PD				
EPRE ratio of OC				
1)				
EPRE ratio of OC	NG to 0	OCNG DMRS		
(Note 1)				
Noc ^{Note 2}	С	onfig 1,2	dBm/SCS	[-104]
		onfig 3		[-101]
Noc ^{Note 2}			dBm/15kH	[-104]
1400		Z	[]	
SS-RSRP Note 3	С	onfig 1,2	dBm/SCS	[-87]
		onfig 3		[-90]
Ê _s /I _{ot}	1	<u> </u>	dB	[17]
Ê _s /N _{oc}			dB	[17]
Io ^{Note3}		0 " 10	dBm/	[-59]
		Config 1,2	9.36MHz	[1 2 3]
		0	dBm/	[-61.9]
		Config 3	38.16MHz	• • • • • • • • • • • • • • • • • • •
Propagation Con-	dition	•		AWGN
		e used such that bot	th cells are full	y allocated and a constant
total transmitted power spectral density is achieved for all OFDM symbols.				
Note 2: Interference from other cells and no				
assumed to be constant over subc				
AWGN of appropriate power for No				
				other parameters for
				ameters themselves.
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DL				
linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.				
linked	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for Cell1 in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for Cell1 in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.6.5.6.2 RRC-based Active BWP Switch

A.6.5.6.2.1 NR FR1- NR FR1 DL active BWP switch of PCell with non-DRX in SA

A.6.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6. Supported test configurations are shown in Table A.6.5.6.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.6.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with bandwidth part configuration BWP-2, sent from the test equipment to the UE, is completely 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 the beginning of the DL slot right after PCell's DL slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$) as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PCell no later than the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$). The UE shall be continuously scheduled on PCell's BWP-2 starting from the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including BWP switch command is sent till the time when RRC Reconfiguration Complete message is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			

Table A.6.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	S	[0.2]	

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	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	1	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	, <u> </u>		1, 2
Initial DL BWP	Config 1,4		DLBWP.0.2
Configuration	Config 2,5	1	
	Config 3,6		
Α	C		N
	C	1	
	C		
Active DL BWP-1	Config 1,4		DLBWP.1.3
Configuration	Config 2,5		
	Config 3,6		
Active DL BWP-2	Config 1,4		DLBWP.1.1
Configuration	Config 2,5	1	
Comgananon	Config 3,6	1	
Initial UL BWP	Config 1,4		ULBWP.0.2
Configuration	Config 2,5	1	02577 .0.2
Comgananon	Config 3,6		
Active UL BWP-1	Config 1,4		ULBWP.1.3
Configuration	Config 2,5		025
Comgananon	Config 3,6		
Active UL BWP-2	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		025
Comgananon	Config 3,6	1	
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	1	SR.1.1 TDD
medearoment enamer	Config 3,6	-	SR2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	_	CR.1.1 TDD
paramotore	Config 3,6	_	CR2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 1,4	1	CCR.1.1 TDD
parameters	Config 3,6	1	CCR.1.1 TDD
OCNG Patterns	Corning 3,0		OP.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
33D Comiguration		1	
SMTC Configuration	Config 3,6		SSB.2 FR1 SMTC.1
SMTC Configuration	Config 1 4	<u> </u>	
TRS Configuration	Config 1,4		TRS.1.1 FDD

		Config 2,5		TRS.1.1 TDD
		Config 3,6		TRS.1.2 TDD
Antenna Configuration				1x2
Propagat	Propagation Condition			AWGN
EPRE rat	tio of PSS to SS	S	dB	0
EPRE rat	tio of PBCH DMI	RS to SSS		
EPRE rat	tio of PBCH to P	BCH DMRS		
EPRE rat	tio of PDCCH DI	MRS to SSS		
EPRE rat	tio of PDCCH to	PDCCH DMRS		
EPRE rat	tio of PDSCH DI	MRS to SSS		
	tio of PDSCH to			
EPRE rat	tio of OCNG DM	RS to SSS ^(Note 1)		
	tio of OCNG to C	OCNG DMRS ^{(Note}		
1)				
Noc ^{Note 2}			dBm/15	[-104]
			kHz	
SS-RSRI	O Note 3		dBm/15 kHz	[-87]
A				
	Ê _s /I _{ot}			17
Ê _s /N _{oc}		ı	dB	17
Io ^{Note3}		Config 1,2,4,5	dBm/	TBD
			9.36MHz	
		Config 3,6	dBm/	TBD
Note 4:	0010 -111-		38.16MHz	
Note 1:				y allocated and a constant
Note 2:				ved for all OFDM symbols.
Note 2: Interference from other cells and r assumed to be constant over sub-				
Note 3:	as AWGN of appropriate power for N _{oc} to be fulfilled. SS-RSRP and Io levels have been derived from other parameters for			
information purposes. They are no				
Note 4:				
		linked with ULBWP		
	ULBWP.1.1; DLBWP.1.3 is linked			
TS 38.213 [3].				

A.6.5.6.2.2.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell in the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6 Measurement procedure

A.6.6.1 Intra-frequency Measurements

A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

	Configuration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	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 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	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
-		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between 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	Cell 1		Cell 2	
		configuration	T1	T2	T1	T2
TDD configuration		1	TN/A		TN/A	
		2	TDDC	TDDConf.1.1 TDDConf.2.1		onf.1.1
		3	TDDC			onf.2.1

PDSCH RMC		1	SR.1.	1 FDD	N/	/A		
configuration		2		1 TDD	1			
		3		1 TDD				
RMSI CORESET		1		1.1 FDD		1 FDD		
RMC		2		1 TDD		1 TDD		
configuration		3		1 TDD		1 TDD		
Dedicated CORESET RMC		1		.1 FDD		.1 FDD		
configuration		2		.1 TDD		.1 TDD		
		3		.1 TDD		.1 TDD		
OCNG Patterns		1, 2, 3		P.1	OF			
TRS		1		.1 FDD		/A		
Configuration		2		.1 TDD	,	/A		
		3		.2 TDD	N,			
IInitial BWP		1, 2, 3		VP.0.1	DLBW			
configuration		4.0.0		VP.0.1	ULBW			
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBW	/P.1.1		
configuration Active UL BWP		1, 2, 3	LII DV	VP.1.1	ULBWP.1.1			
configuration		1, 2, 3	ULBV	VP.1.1	ULBW	/P.1.1		
RLM-RS		1, 2, 3		SSB SSB		SD.		
	dBm/SCS	1, 2, 3	3.		·98	36		
N_{oc} Note 2	ubili/SCS	2		-98				
		3				95		
	dBm/15 kHz	1						
N_{oc} Note 2	UDIII/ 13 KHZ	2	-98					
		3	-					
☆ /*	dB	1	4	-1.46	-Infinity	-1.46		
\hat{E}_{s}/I_{ot}	ub	2	-	-1.40	-inininty	-1.40		
		3	=					
A /27	dB	1	4	4	-Infinity	4		
\hat{E}_s/N_{oc}	d B	2	† '			•		
		3						
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94		
33	32, 333	2	-94	-94	-Infinity	-94		
		3	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25		
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25		
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16		
Propagation		1, 2, 3		AWGN				
Condition								

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.6.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.2 SA event triggered reporting tests without gap under DRX

A.6.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.2.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.2.2-1, A.6.6.1.2.2-2 and A.6.6.1.2.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.2.2-1: Supported test configurations

Confi	iguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: T	The UE is only re	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.2		
		2	SMTC.1		
		3	SMTC.1		

A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between PCell		1, 2, 3	3 μs		Synchronous EN-DC
and PSCell		4			Cymahranaya aalla
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.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Cell 1		Ce	ell 2
		configuration	T1	T2	T1	T2
TDD configuration		1	T	V/A	TN	V/A
		2	TDDC	onf.1.1	TDDConf.1.1	
		3	TDDC	onf.2.1	TDDC	onf.2.1
PDSCH RMC		1	SR.1.	1 FDD	N	/A
configuration		2	SR.1.	1 TDD	1	
		3	SR.2.	1 TDD		
RMSI CORESET		1		1 FDD	CR.1.	1 FDD
RMC		2	CR.1.	1 TDD		1 TDD
configuration		3		1 TDD	CR.2.	1 TDD
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD
CORESET RMC		2		.1 TDD		.1 TDD
configuration		3		2.1 TDD		.1 TDD
OCNG Patterns		1, 2, 3		P.1	OP.1	
TRS configuration		1		.1 FDD	N/A	
3		2		.1 TDD	N/A	
		3		.2 TDD		/A
Ilnitial BWP		1, 2, 3	DLBV	VP.0.1	DLBWP.0.1	
configuration			ULBV	VP.0.1	ULBWP.0.1	
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBWP.1.1	
configuration						
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBWP.1.1	
configuration						
RLM-RS		1, 2, 3	S	SB		SB
N_{oc} Note 2	dBm/SCS	1			-98	
00		2			-98	
		3			-95	
N_{oc} Note 2	dBm/15 kHz	1			-98	
00		2				
		3			-Infinity	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	4 -1.46		-1.46
S / Ot		2				
A /	-ID	3		1	ladia ite e	1
\hat{E}_s/N_{oc}	dB	2	4	4	-Infinity	4
		3				
		ე პ				

SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation Condition		1, 2, 3		AV	VGN	

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.6.6.1.2.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX

A.6.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.3.1-1 and A.6.6.1.3.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.3.2-1: Supported test configurations

	Configuration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	, , ,					

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
-		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
		2	CSI-RS.1.2 TDD	
		3	CSI-RS.2.2 TDD	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX	ms	1, 2, 3		OFF
Time offset between 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				II 2
		configuration	T1	T2	T1	T2	
TDD configuration		1	TN/A TDDConf.1.1		TN/A		
		2			TDDConf.1.1		
		3	TDDC	TDDConf.2.1		onf.2.1	
PDSCH RMC		1	SR.1.1 FDD		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		.1 TDD		.1 TDD	
configuration		3		.1 TDD		.1 TDD	
OCNG Patterns		1, 2, 3		P.1	OF		
TRS configuration		1		.1 FDD	N,		
ga.a		2		.1 TDD		/A	
		3		.2 TDD	N,		
Ilnitial BWP		1, 2, 3		/P.0.1	DLBW		
configuration			ULBV	/P.0.1	ULBW	/P.0.1	
Active DL BWP		1, 2, 3	DLBV	/P.1.2	DLBW	/P.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBV	/P.1.1	ULBW	/P.1.1	
configuration							
RLM-RS		1, 2, 3	CSI	-RS	SSB		
N_{ac} Note 2	dBm/SCS	1		-98 -98			
oc		2					
		3			95		
N_{oc} Note 2	dBm/15 kHz	1		-98			
- voc		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 / OC	_	2					
OO DODD Note 3	-ID (000 I-II-	3	0.4	0.4	La Ciacita	0.4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
	_	<u>2</u> 3	-94	-94	-Infinity	-94 -91	
lo.	dDm/0.26 MU=		-91	-91	-Infinity		
lo	dBm/9.36 MHz dBm/9.36 MHz	2	-64.60	-62.25 -62.25	64.60 64.60	-62.25	
	dBm/38.16 MHz	3	-64.60			-62.25 -56.16	
Propagation	UDITI/36. TO IVITIZ	1, 2, 3	-58.50	-56.16	58.50	-30.10	
Condition				AWGN			
Note 1: The reso	urces for uplink transm	ission are assigne	ed to the UE	orior to the	start of time	period	
T2.	•	J	•			=	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP levels have been derived from other parameters for information purposes. They are Note 3: 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%.

The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement NOTE: reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

Con	figuration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and (Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3	40		
Measurement gap length	ms	1, 2, 3	6		
Measurement gap offset	ms	1, 2, 3	39		
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
CSI-RS parameters		1	CSI-RS.1.2 F	DD	
		2	CSI-RS.1.2 T	DD	
		3	CSI-RS.2.2 T	DD	

A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.2	
Time offset between 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		Ce	ell 2	
		configuration	T1	T2	T1	T2	
TDD configuration		1	T	V/A	TN/A		
		2	TDDConf.1.1		TDDC	TDDConf.1.1	
		3	TDDC	onf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N	/A	
configuration		2	SR.1.1 TDD		1		
		3	SR.2.1 TDD				
RMSI CORESET		1		1 FDD	CR.1.	1 FDD	
RMC		2		1 TDD		1 TDD	
configuration		3		1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2		.1 TDD		.1 TDD	
configuration		3		2.1 TDD		1.1 TDD	
OCNG Patterns		1, 2, 3		P.1	OP.1		
TRS configuration		1	TRS.1.1 FDD		N/A		
into comiguration		2	TRS.1.1 TDD		N/A		
		3	TRS.1.2 TDD		N/A		
Ilnitial BWP		1, 2, 3		VP.0.1	DLBWP.0.1		
configuration		, ,	ULBV	VP.0.1	ULBWP.0.1		
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBWP.1.1		
configuration							
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBWP.1.1		
configuration							
RLM-RS		1, 2, 3	CS	I-RS		SB	
N_{oc} Note 2	dBm/SCS	1			-98		
00		2	-		-98		
		3			-95		
Note 2	dBm/15 kHz	1			-98		
oc		2					
		3		1		,	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4 -1.46		-Infinity	-1.46	
s / ot		2	1				
	ID.	3			1.6.4		
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
31 00		2	-				
		3					

-94		
~ .	-Infinity	-94
-91	-Infinity	-91
2.25	64.60	-62.25
2.25	-64.60	-62.25
6.16	58.50	-56.16
AV	VGN	
	-91 62.25 62.25 66.16	-91 -Infinity 62.2564.60 62.25 -64.60

Note 1: Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Table A.6.6.1.4.2-1Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of

appropriate power for N_{oc} to be fulfilled.

Note 3: Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.1.4.2-4: Void

Table A.6.6.1.4.2-5: Void

A.6.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between 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	Cell 1	Cell 2	
		configuration	T1 T2	T1 T2	
TDD configuration		1	N/A	N/A	
PDSCH RMC		1	SR.1.1 FDD	N/A	
configuration					
RMSI CORESET		1	CR.1.1 FDD	CR.1.1 FDD	
RMC					
configuration					
Dedicated		1	CCR.1.1 FDD	CCR.1.1 FDD	
CORESET RMC					
configuration					
OCNG Patterns		1	OP.1	OP.1	
TRS configuration		1	TRS.1.1 FDD	N/A	
IInitial BWP		1	DLBWP.0,1	DLBWP.0.1	
configuration			ULBWP.0.1	ULBWP.0.1	
Active DL BWP		1	DLBWP.1.1	DLBWP.1.1	
configuration					
Active UL BWP		1	ULBWP.1.1	ULBWP.1.1	
configuration					
RLM-RS		1	SSB	SSB	
N_{oc} Note 2	dBm/SCS	1	-98		
N_{oc} Note 2	dBm/15 kHz	1		-98	

$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
\hat{E}_s/N_{oc}	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	64.60	-62.25
Propagation Condition		1		AV	VGN	

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.6.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading

A.6.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.6.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.6.2-1 and A.6.6.1.6.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.6.2-1: Supported test configurations

Configuration	Description					
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					

Table A.6.6.1.6.2-2: General test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between 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	Cell 1 T1 T2		Ce	II 2
		configuration			T1	T2
TDD configuration		1	N/A		N/A	
PDSCH RMC		1	SR.1.	1 FDD	N/	/A
configuration						
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD
RMC						
configuration						
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD
CORESET RMC						
configuration						
OCNG Patterns		1	OF	P.1	OP.1	
TRS configuration		1	TRS.1	.1 FDD	N/A	
IInitial BWP		1	DLBV	/P.0.1	DLBW	/P.0.1
configuration			ULBV	/P.0.1	ULBW	/P.0.1
Active DL BWP		1	DLBV	/P.1.2	DLBW	/P.1.1
configuration						
Active UL BWP		1	ULBV	/P.1.1	ULBW	/P.1.1
configuration						
RLM-RS		1	CSI-RS		SS	SB
N_{oc} Note 2	dBm/SCS	1	-98			
N_{oc} Note 2	dBm/15 kHz	1		-	·98	

$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
\hat{E}_s/N_{oc}	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	64.60	-62.25
Propagation Condition		1	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.6.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2 Inter-frequency Measurements

A.6.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.6.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.1.1-1, A.6.6.2.1.1-2 and A.6.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only re	ne UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell ha	is 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 Test 1 Test 2		Comment		
		configurati on					
NR RF Channel Number		Config 1,2,3	1, 2		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 9		39 9		
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1		
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Normal				
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0		L3 filtering is not used		
DRX		Config 1,2,3	OFF		DRX is not used		
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.		
		Config 2,3	3μs		Synchronous cells.		
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	1	1			

Table A.6.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 1		С	ell 2
		configuratio n	T1 T2		T1	T2
NR RF Channel Number		Config 1,2,3	1	1		2
Duplex mode		Config 1	FDD			
		Config 2,3		TDD		

TDD configu	ıration		Config 1					
comigu			Config 2			Conf.1.1		
			Config 3		TDDConf.2.1			
BW _{channel}		MHz	Config 1,2	2 10: $N_{RB,c} = 52$				
			Config 3			RB,c = 106		
BWP BW		MHz	Config 1,2			$N_{RB,c} = 52$		
	T		Config 3			$_{RB,c} = 106$		
BWP	Initial DL BWP			DLBW			NA	
configurati	Initial UL BWP		0 " 1 0	ULBW			NA	
on	Dedicated DL BWP		Config 1, 2, 3	DLBW	/P.1.1		NA	
	Dedicated UL BWP			ULBW			NA	
TRS configu	ration		Config 1	TRS.1.	1 FDD		NA	
			Config 2	TRS.1.	1 TDD		NA	
			Config 3	TRS.1.	2 TDD		NA	
OCNG Patte	erns defined in		Config 1,2,3					
A.3.2.1.1 (O			3 , ,	OF	P.1)P.1	
PDSCH Ref	erence		Config 1	SR.1.	1 FDD		-	
measureme	nt channel		Config 2		1 TDD	1		
			Config 3	SR2.1		1		
CORESET F	Reference		Config 1	CR.1.			_	
Channel			Config 2	CR.1.		1		
			Config 3	CR2.1		1		
SMTC config in A.3.11	guration defined		Config 1	SMT	SMTC.2 SMTC.		/ITC.5	
			Config 2, 3	SMT	C.1	SMTC.4		
PDSCH/PD0	CCH subcarrier	kHz	Config 1,2			15		
spacing			Config 3			30		
EPRE ratio	of PSS to SSS							
EPRE ratio of to SSS	of PBCH DMRS							
	of PBCH to PBCH							
EPRE ratio of to SSS	of PDCCH DMRS							
EPRE ratio of PDCCH DM	of PDCCH to RS		Config 1,2,3	()		0	
EPRE ratio of to SSS	of PDSCH DMRS							
EPRE ratio of PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio	PRE ratio of OCNG to							
OCNG DMR	S (Note 1)							
N_{oc} Note2		dBm/15 kHz			-98		-98	
$N_{oc}^{ m Note2}$		dBm/S	Config 1,2				-98	
	40.2	CS	Config 3	-9			-95	
SS-RSRP No	ne 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91	
♠ /r		CS	Config 3	-91 4	-91 4	-Infinity	-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	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	GN	A۱	NGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.6.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.2.1-1, A.6.6.2.2.1-2 and A.6.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only re	UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.2.1-2: 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			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	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		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39 9				
SMTC-SSB parameters		Config 1	SSB.1 FR1			As specified in clause A.3.10.1	
		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2 FR1			As specified in clause A.3.10.1	
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms			Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3μs			Synchronous cells.	
T1	s	Config 1,2,3	5				
T2	S	Config 1,2,3	1.1	11	1.1	11	

Table A.6.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Unit Test Cell 1 C		Cell 1		ell 2
		configuratio	T1 T2		T1	T2
		n				
NR RF Channel Number		Config 1,2,3	1		2	
Duplex mode		Config 1	FDD			

			Config 2,3		TDD	
TDD configura	ation		Config 2,3	Not .	Applicable	
			Config 2		DConf.1.1	
			Config 3		OConf.2.1	
BW _{channel}		MHz	Config 1,2		N _{RB,c} = 52	
			Config 3	40: N	$N_{RB,c} = 106$	
BWP BW		MHz	Config 1,2	10:	$N_{RB,c} = 52$	
			Config 3		N _{RB,c} = 106	
BWP	Initial DL BWP		Config 1, 2,	DLBWP.0.1	NA	
configuratio	Latitati DIA/D		3	LILDWD 0.4	NIA.	
n	Initial UL BWP		Config 1, 2, 3	ULBWP.0.1	NA	
	Dedicated DL			DLBWP.1.1	NA	
	BWP					
	Dedicated UL			ULBWP.1.1	NA	
TD0 ('	BWP					
TRS configura	ation		Config 1	TRS.1.1 FDD	NA	
			Config 2	TRS.1.1 TDD	NA	
				TRS.1.2 TDD	NA	
			Config 3	11(0.1.2 100	LANZ	
OCNG Patter			Config 1,2,3			
A.3.2.1.1 (OP	.1)			OP.1	OP.1	
PDSCH Refer	rence		Config 1	SR.1.1 FDD		
measurement					_	
modedicinom	· Orianii Ori		Config 2	SR.1.1 TDD	4	
CORESET Re	foronco		Config 3 Config 1	SR2.1 TDD CR.1.1 FDD	-	
Channel	elerence		Config 2	CR.1.1 TDD	- -	
Charine			Config 3	CR2.1 TDD		
SMTC configu	uration defined					
in A.3.11			Config 1	SMTC.2	SMTC.5	
			Config 2, 3	SMTC.1	SMTC.4	
PDSCH/PDC	CH subcarrier	kHz	Config 1,2		15	
spacing			Config 3		30	
EPRE ratio of	PSS to SSS					
EPRE ratio of	PBCH DMRS					
to SSS						
	PBCH to PBCH					
DMRS						
	PDCCH DMRS					
to SSS EPRE ratio of	DDCCH to					
PDCCH DMR			Config 1,2,3	0	0	
	PDSCH DMRS		3 , ,,	-		
to SSS	to SSS EPRE ratio of PDSCH to PDSCH					
PDSCH						
	EPRE ratio of OCNG DMRS o SSS(Note 1)					
EPRE ratio of	OCNG to					
OCNG DMRS	(Note 1)	alDue- /4.5	Config 4 0 0	00	00	
$N_{oc}^{ m Note2}$		dBm/15 kHz	Config 1,2,3	-98	-98	
$N_{oc}^{\rm Note2}$		dBm/S	Config 1,2	-98	-98	
		CS	Config 3	-95	-95	
SS-RSRP Note	3		Config 1,2	-94 -94	-Infinity -91	

	dBm/S CS	Config 3	-91	-91	-Infinity	-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	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AWGN AWG		VGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

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
i leiu	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 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	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.6.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	9	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	1.1	1	

Table A.6.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Par	ameter	Unit	Test	Cell 1		Cell 2	
			configuratio n	T1	T2	T1	T2
NR RF Chan	nel Number		Config 1,2,3		1		2
Duplex mode)		Config 1		FI	DD	
			Config 2,3		TI	DD	
TDD configur	ation		Config 1		Not Ap	plicable	
			Config 2		TDDC	onf.1.1	
			Config 3		TDDC	onf.2.1	
BW _{channel}		MHz	Config 1,2		10: N _R	$_{\rm B,c} = 52$	
			Config 3		40: N _{RE}	s,c = 106	
BWP BW		MHz	Config 1,2		10: N _R	$_{\rm B,c} = 52$	
			Config 3		40: N _{RE}	$_{3,c} = 106$	
BWP	Initial DL BWP			DLBV	VP.0.1		NA
configuratio	Initial UL BWP			ULBV	VP.0.1		NA
n	Dedicated DL		Config 1, 2,	DLBV	VP.1.1		NA
	BWP		3				
	Dedicated UL BWP			ULBWP.1.1			NA
TRS configur	ation		Config 1	TRS.1	.1 FDD		NA
			Config 2	TRS.1	.1 TDD		NA

		Config 3	TRS.1	.2 TDD		NA	
OCNG Patterns defined in		Config 1,2,3		P.1	(DP.1	
A.3.2.1.1 (OP.1)		, , , , , , , , , , , , , , , , , , ,					
PDSCH Reference		Config 1	SR.1.	.1 FDD		-	
measurement channel		Config 2	SR.1.	1			
		Config 3		1 TDD	†		
CORESET Reference		Config 1		.1 FDD		-	
Channel		Config 2		.1 TDD	1		
		Config 3		1 TDD	1		
SMTC configuration defined in A.3.11		Config 1		TC.2	SI	MTC.5	
		Config 2, 3	SM	TC.1	SI	MTC.4	
PDSCH/PDCCH subcarrier	kHz	Config 1,2			15		
spacing		Config 3		(30		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to							
PDCCH DMRS		Config 1,2,3	0 0			0	
EPRE ratio of PDSCH DMRS							
to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
N_{oc} Note2	dBm/15 kHz		-!	98		-98	
$N_{oc}^{ m Note2}$	dBm/S	Config 1,2		98		-98	
¹ ▼ oc	CS	Config 3		95		-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91	
	CS	Config 3	-91	-91	-Infinity	-88	
\hat{E}_s/I_{ot}	dB	Config 1,2,3	4	4	-Infinity	7	
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2	
	dBm/38 .16MHz	Config 3	-58.4	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3	AW	VGN	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.

A.6.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.6.1-1, A.6.6.2.6.1-2 and A.6.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided at least once every 500 ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	E is only required to be tested in one of the supported test configurations			
Note 2:	target NR cell ha	target NR cell has the same SCS, BW and duplex mode as NR serving cell			

Table A.6.6.2.6.1-2: 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	
NR RF Channel		on Config 1,2,3	1, 2	2	3	4	Two FR1 NR carrier frequencies is
							used.
Active cell		Config 1,2,3		II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		9		
SMTC-SSB parameters		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2	SSB.1				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	ıl			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
Time offset between		Config 1	3 ms				Asynchronous cells.
serving and neighbour						The timing of Cell 2 is 3ms later	
cells						than the timing of Cell 1.	
		Config 2,3	3 μs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	1.3	13.5	1.3	13.5	

Table A.6.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Ce	Cell 1		Cell 2	
			configuratio	T1	T2	T1	T2	
			n					
NR RF Char	nnel Number		Config 1,2,3	1	ļ		2	
Duplex mode	Э		Config 1			DD		
			Config 2,3		-	ΓDD		
TDD configu	ration		Config 1		Not A	pplicable		
			Config 2		TDD	Conf.1.1		
			Config 3		TDD	Conf.2.1		
BW _{channel}		MHz	Config 1,2		10: N	$I_{RB,c} = 52$		
			Config 3	40: N _{RB,c} = 106				
BWP BW		MHz	Config 1,2		10: N	$I_{RB,c} = 52$		
			Config 3		40: Ni	RB,c = 106		
BWP	Initial DL BWP			DLBW	/P.0.1		NA	
configurati	Initial UL BWP			ULBW	/P.0.1		NA	
on	Dedicated DL		Config 1, 2,	DLBWP.1.1 NA		NA		
	BWP		3					
	Dedicated UL BWP			ULBW	/P.1.1		NA	

TRS configuration		Config 1	TRS 1	1 FDD		NA	
Tree comigaration		Config 2		1 TDD		NA	
		Config 3		2 TDD		NA	
OCNG Patterns defined in		Config 1,2,3	11(0.11	2 100		147.	
A.3.2.1.1 (OP.1)		Oomig 1,2,0	OF	9 1	ے ا)P.1	
PDSCH Reference		Config 1				-	
measurement channel					-		
moded of them of driving		Config 2		1 TDD			
0005057.0.(Config 3	SR2.1				
CORESET Reference		Config 1	CR.1.			-	
Channel		Config 2	CR.1.				
0.50		Config 3	CR2.1	טטו ו			
SMTC configuration defined in A.3.11		Config 1	SMT	ГС.2	SN	/ITC.5	
		Config 2, 3	SMT	ΓC.1	SN	ИТС.4	
DDCCH/DDCCH subservior	I/LI=	Config 1.0			15		
PDSCH/PDCCH subcarrier	kHz	Config 1,2			15		
spacing EPRE ratio of PSS to SSS		Config 3			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 1,2,3	()		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		-9	08		-98	
· oc	kHz						
$N_{oc}^{ m Note2}$	dBm/S	Config 1,2	-g)8		-98	
- · oc	CS	Config 3	-9			-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91	
	CS	Config 3	-91	-91	-Infinity	-88	
ĉ /r	dB	Config 1,2,3	4	4	-Infinity	7	
\hat{E}_s/I_{ot}					-		
$\hat{E}_{_s}/N_{_{oc}}$	dB	Config 1,2,3	4	4	-Infinity	7	
lo ^{Note3}	dBm/9.	Config 1,2	-64.59	-64.59	-70.05	-62.26	
	36MHz	,					
	dBm/38	Config 3	-58.49	-58.49	-63.94	-56.15	
	.16MHz	_					
Propagation Condition		Config 1,2,3	AWGN		I A\	NGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

A.6.6.3 Inter-RAT Measurements

A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.1.1-2: 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

Paran	Parameter		Configuration	Cell 1		
				T1	T2	
RF channel number			1, 2, 3, 4, 5, 6	1		
Duplex mode			1, 2, 3	FDD TDD		
			4, 5, 6			
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1		
	SCS=30 KHz		3, 6	TDDConf.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)	
			1, 4	SR.1	.1 FDD	

		T		
PDSCH reference measurement		2, 5		1.1 TDD
channel		3, 6		2.1 TDD
CORSET reference channel		1, 4		1.1 FDD
		2, 5		1.1 TDD
		3, 6		2.1 TDD
BWP configurations Initial DL BWI	P	1, 2, 3, 4, 5, 6	DLE	BWP.0.1
Dedicated DL	BWP	1, 2, 3, 4, 5, 6	DLE	3WP.1.1
Initial UL BWI	P	1, 2, 3, 4, 5, 6	ULE	BWP.0.1
Dedicated UL	BWP	1, 2, 3, 4, 5, 6	ULE	BWP.1.1
OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6	(OP.1
SMTC configuration		1, 2, 3, 4, 5, 6	SI	MTC.1
SSB configuration		1, 2, 4, 5	SSI	3.1 FR1
•		3, 6	SSI	3.2 FR1
b2-Threshold1	al Duna	1, 2, 4, 5		96
	dBm	3, 6		93
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH_DMRS to S	SS			
EPRE ratio of PBCH to PBCH_DI				
EPRE ratio of PDCCH_DMRS to				
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 S	SS			
EPRE ratio of OCNG to OCNG D				
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6		-104
	dBm/SCS	1, 2, 4, 5		-104
N_{oc}^{Note2}		3, 6		-101
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	116	70
Ê _s /I _{ot} ^{Note3}	dB	1, 2, 3, 4, 5, 6	116	70
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	88	104
		3, 6	85	101
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	88	104
_ ·		3, 6	85	101
	dBm/9.36	1, 2, 4, 5	59.94	73.04
. Note?	MHz	., _, ., •	23.01	. 0.0 1
Io ^{Note3}	dBm/38.16	3, 6	53.84	66.93
	MHz	-, -		
Propagation condition		1, 2, 3, 4, 5, 6	ETDLA30	
Antenna Configuration and Corre	lation	1, 2, 3, 4, 5, 6		2 Low

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, 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}		1, 2, 2	_		
TDD uplink-downlink		4, 5, 6	1		
configuration ^{Note1}		, , , ,			
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB} ,	c = 25	
		, , -, , -, -	10 MHz: N _{RB}		
			20 MHz: N _{RB} ,		
PDSCH parameters:		1, 2, 3	5 MHz: R.7		
DL Reference Measurement		, , -	10 MHz: R.3		
Channel ^{Note2}			20 MHz: R.6		
		4, 5, 6	5 MHz: R.4		
		1, 2, 2	10 MHz: R.0		
			20 MHz: R.3		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11		
parameters:		., _, -	10 MHz: R.6		
DL Reference Measurement			20 MHz: R.1		
Channel ^{Note2}		4, 5, 6	5 MHz: R.11		
		., 0, 0	10 MHz: R.6 TDD		
			20 MHz: R.10 TDD		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD		
		., _, o	10 MHz: OP.10 FDD 20 MHz: OP.17 FDD		
		4, 5, 6	5 MHz: OP.9		
		1, 0, 0	10 MHz: OP.		
			20 MHz: OP.		
PBCH RA		1, 2, 3, 4, 5, 6			
PBCH_RB		1, =, =, 1, 1, =, =			
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA			9		
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
Noc ^{Note4}	dBm/15kHz	123156	404		
Ê _s /N _{oc}	dBIII/13KI12	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-104 -Infinity	17	
Ês/Noc Ês/lot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}				-87	
SCH RP ^{Note5}	dBm/15kHz dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-Infinity -Infinity	-87	
ID (0141) 4 0 0 4 5 0 70 00 4		-76.22+10log (N _{RB,c} /50)	-87 -59.13+10log (N _{RB,c}		
Io ^{Note5}	dBill/9ivii iz	1, 2, 3, 4, 5, 6	-70.22+1010g (NRB,c/30)	/50)	
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70)	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lov	V	
Correlation Matrix					

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

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.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle.

Supported test configurations are shown in table A.6.6.3.2.1-1. General test parameters are provided in Table A.6.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.2.1-3 and A.6.6.3.2.1-4, respectively.

Table A.6.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1 Test 2		Comment
			Value	
NR RF Channel Number		1		1 NR carrier frequency is used in the test
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables		
		A.6.6.3.2.1- A.6.6.3.2.1-		
Active cell		Cell 1		Cell 1 is on RF channel number 1
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE
·				gap pattern.
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP		Measurement quantity for Cell 2
measurement quantity				·
b2-Threshold1	dBm	Note 1		SS-RSRP threshold for SS-RSRP
				measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-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		DRX.1	DRX.2	DRX cycle configurations DRX.1 and DRX.2 are defined in Table A.3.3.1-1 and Table
				A.3.3.2-1 respectively.
T1	S	5	•	
T2	S	5	15	
Note 1: Values are define	ed in Table	A.6.6.3.2.1-3	3	

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Para	Parameter Un		Configuration		Cell 1	
				T1	T2	
RF channel number	er		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	
	SCS=30 KHz		3, 6	TDD	Conf.2.1	
BW _{channel}		MHz	1, 4	10: N _{RB}	c = 52 (FDD)	
			2, 5	10: N _{RB}	c = 52 (TDD)	
			3, 6	40: N _{RB,0}	= 106 (TDD)	
PDSCH reference	measurement		1, 4	SR.	1.1 FDD	
channel			2, 5	SR.	1.1 TDD	
			3, 6	SR.	2.1 TDD	
CORSET reference	e channel		1, 4	CR.	1.1 FDD	
			2, 5	CR.	1.1 TDD	
			3, 6	CR.	2.1 TDD	
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLI	BWP.0.1	
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLI	BWP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULI	BWP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULI	3WP.1.1	
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6		OP.1	
SMTC configuration	n		1, 2, 3, 4, 5, 6	S	MTC.1	
SSB configuration	•		1, 2, 4, 5		B.1 FR1	
			3, 6	SS	B.2 FR1	
b2-Threshold1		dBm	1, 2, 4, 5		96	

		3, 6		93
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to				
PDCCH_DMRS	dB	1, 2, 3, 4, 5, 6		0
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-104
Noc		3, 6	-101	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	116	70
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	116	70
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	88	104
		3, 6	85	101
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	88	104
		3, 6	85	101
	dBm/9.36	1, 2, 4, 5	59.94	73.04
IoNote3	MHz			
10	dBm/38.16	3, 6	53.84	66.93
	MHz			
Propagation condition		1, 2, 3, 4, 5, 6	ETDLA30	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x	2 Low

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, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2			
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	2			
Duplex mode		1, 2, 3	FDD			
		4, 5, 6	TDD			
TDD special subframe configuration ^{Note1}		4, 5, 6	6			
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1			
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c}	= 25		
			10 MHz: N _{RB}	$_{,c} = 50$		
			20 MHz: N _{RB} ,	= 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.7	FDD		
DL Reference Measurement			10 MHz: R.3	FDD		
Channel ^{Note2}			20 MHz: R.6	FDD		
		4, 5, 6	5 MHz: R.4	TDD		
			10 MHz: R.0	TDD		
			20 MHz: R.3	TDD		

PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.1	1 FDD		
parameters:			10 MHz: R.	6 FDD		
DL Reference Measurement			20 MHz: R.1	0 FDD		
Channel ^{Note2}		4, 5, 6	5 MHz: R.1	1 TDD		
			10 MHz: R.	6 TDD		
			20 MHz: R.1	0 TDD		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.2	20 FDD		
			10 MHz: OP.			
			20 MHz: OP.	17 FDD		
		4, 5, 6	5 MHz: OP.	9 TDD		
			10 MHz: OP	– –		
			20 MHz: OP.7 TDD			
PBCH_RA						
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA						
PHICH_RB	dB	1, 2, 3, 4, 5, 6	0			
PDCCH_RA						
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RA ^{Note3}						
OCNG_RB ^{Note3}						
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104			
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17		
Ê _s /I _{ot} ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17		
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87		
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87		
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	0		
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Low			

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.4 L1-RSRP measurement for beam reporting

A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

Editor's Note: to be added based on A.4.6.3.1.

A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.6.6.3.1.

A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

Editor's Note: to be added based on A.4.6.3.3.

A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.6.6.3.3.

A.6.7 Measurement Performance requirements

A.6.7.1 SS-RSRP

A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations in each supported band

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
Faidii	ietei	Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID			489	0	489	0	489	0
SSB ARFCN			fre	eq1	fre	q1	fre	q1
Duplex mode	Config 1		FDD					
Duplex mode	Config 2,3	TDD						
	Config 1		Not Applicable TDDConf.1.1					
TDD configuration	Config 2							
	Config 3			•	TDDC	onf.2.1	•	

	Config 1				10: N _{RE}	s,c = 52			
BW _{channel}	Config 2	MHz			10: N _{RE}	s,c = 52			
	Config 3				40: N _{RB}	c = 106	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		
	Config 1				10: N _{RE}	s,c = 52			
BWP BW	Config 2				10: N _{RE}	s,c = 52			
	Config 3				40: N _{RB}	c = 106			
Downlink initial BWP cor				DLBW	P.0.1				
Downlink dedicated BWI	onfiguration				DLBW	P.1.1			
Uplink initial BWP config	uration		ULBWP.0.1						
Uplink dedicated BWP c	onfiguration				ULBW				
TRS configuration	Config 1		TRS.1. 1 FDD	NA	TRS.1 .1 FDD	NA		NA	
	Config 2		TRS.1. 1 TDD	NA	TRS.1 .1 TDD	NA		NA	
	Config 3		TRS.1. 2 TDD	NA	TRS.1 .2 TDD	NA		NA	
DRX Cycle		ms	Not Applicable						
	Config 1		SR.1.1 FDD		SR.1.1 FDD				
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-		-	
	Config 3		SR2.1 TDD		SR2.1 TDD				
	Config 1		CR.1.1 FDD		CR.1.1 FDD				
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-		-	
Uplink initial BWP config Uplink dedicated BWP of TRS configuration DRX Cycle PDSCH Reference measurement channel	Config 3		CR2.1 TDD		CR2.1 TDD				
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD				
Control channel RMC	Config 2		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 configuration	Config 2		SSB 1 FR1	-	SSB 1 FR1	-		-	
	Config 3		SSB 2 FR1		SSB 2 FR1		SSB 2 FR1		

		Config 1		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1		
				FR1 SSB.1	FR1 SSB.1	FR1 SSB.1	FR1 SSB.1	FR1 SSB.1	FR1 SSB.1		
SSB config	juration	Config 2		FR1	FR1	FR1	FR1	FR1	FR1		
		Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1		
Time offset	t with Cell 2	Config 1	ms	-	3	-	3	-	3		
Time onse	With Och 2	Config 2,3	μS	-	3	-	3	-	3		
SMTC con	figuration	Config 1				SMT	TC.2				
SIVITO COIT	nguration	Config 2,3				SMT	TC.1				
OCNG Pat	OCNG Patterns			OCNG pattern 1							
PDSCH/PD	OCCH	Config 1,2	kHz			15 I	кHz				
subcarrier	spacing	Config 3	NI IZ			30k	кHz				
	of PSS to SS										
	of PBCH DM of PBCH to F										
	of PDCCH D										
		PDCCH DMRS	dB	_	_	0	_	0	_		
EPRE ratio	of PDSCH D	MRS to SSS	ав	0	0	0	0	0	0		
	of PDSCH to										
		MRS to SSS(Note 1) OCNG DMRS (Note									
1)	O OCING IO	OCING DIVING (Note									
	NR_FDD_FR1_ NR_TDD_FR1_							-114			
		NR_FDD_FR1_B						-113.5			
	Config 1,2	NR_TDD_FR1_C	-					-113			
		NR_FDD_FR1_D, NR_TDD_FR1_D		-10	06	-{	38	-112.5			
		NR_FDD_FR1_E,						-112.			
		NR_TDD_FR1_E						-112			
Noto?		NR_FDD_FR1_G	dBm/15Kh					-111			
$N_{oc}^{ m Note2}$		NR_FDD_FR1_H	Z					-11	0.5		
		NR_FDD_FR1_A, NR_TDD_FR1_A						_1	14		
		NR_FDD_FR1_B							3.5		
		NR_TDD_FR1_C							13		
	Config 3	NR_FDD_FR1_D,		N	ot Note 5	-(94		2.5		
	· ·	NR_TDD_FR1_D NR_FDD_FR1_E,		applica	bie voic c			-111	2.5		
		NR_TDD_FR1_E						-1	12		
		NR_FDD_FR1_G							11		
		NR_FDD_FR1_H							0.5 ne as		
	Config 1,2			-10	06	-8	38		ie as I5kHz		
		NR_FDD_FR1_A,							11		
		NR_TDD_FR1_A NR_FDD_FR1_B						11	0.5		
Noto?		NR_TDD_FR1_C							10		
$N_{oc}^{ m Note2}$	Confir 2	NR_FDD_FR1_D,	dBm/SCS	N	ot	,	24		9.5		
	Config 3	NR_TDD_FR1_D		applica	ble ^{Note 5}		91				
		NR_FDD_FR1_E,						-1	09		
		NR_TDD_FR1_E NR_FDD_FR1_G						-1	08		
		NR_FDD_FR1_H							7.5		

\hat{E}_{s}/I_{ot}			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
\hat{E}_s/N_{oc}			dB	6	1	6	1	3	0
		NR_FDD_FR1_A, NR_TDD_FR1_A						- 111.00	- 114.00
		NR_FDD_FR1_B						- 110.50	- 113.50
		NR_TDD_FR1_C			-105	-82		- 110.00	- 113.00
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,		-100			-87	109.50	112.50
		NR_TDD_FR1_E						109.00	112.00
		NR_FDD_FR1_G						108.00	111.00
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS					- 107.50	- 110.50
e3		NR_FDD_FR1_A, NR_TDD_FR1_A						108.00	- 111.00
		NR_FDD_FR1_B						- 107.50	- 110.50
		NR_TDD_FR1_C		Not	Not		-90	- 107.00	- 110.00
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,		applica ble ^{Note 5}	applic able ^{Not} e 5	-85		- 106.50	- 109.50
		NR_TDD_FR1_E,						106.00	109.00
		NR_FDD_FR1_G					-90	105.00	108.00
		NR_FDD_FR1_H						- 104.50	- 107.50
		NR_FDD_FR1_A, NR_TDD_FR1_A						-80	.03
		NR_FDD_FR1_B							.53
	0 " 10	NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/						.53
	Config 1,2	NR_TDD_FR1_D NR_FDD_FR1_E,	9.36MHz	-70	.09	-52	.09	-78	.03
		NR_TDD_FR1_E							
Io ^{Note3}		NR_FDD_FR1_G NR_FDD_FR1_H						-77 -76	.03
		NR_FDD_FR1_A,							.94
		NR_TDD_FR1_A NR_FDD_FR1_B							.44
	Confin 2	NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/	N	ot	54	00		.94 .44
	Config 3	NR_TDD_FR1_D NR_FDD_FR1_E,	38.16MHz	applicat	ole ^{Note 5} -	-51	.99	-71	
		NR_TDD_FR1_E NR_FDD_FR1_G							.94
		NR_FDD_FR1_H							.44

Propagation condition		-	AWGN			
Antenna	configuration		1x2			
Note 1:	OCNG shall be used such that both density is achieved for all OFDM sy		allocated and a constant total transmitted power 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:	SS-RSRP and lo levels have been of settable parameters themselves.	derived from o	ther parameters for information purposes. They are not			
Note 4:	SS-RSRP minimum requirements a receiver antenna port.	re specified as	ssuming independent interference and noise at each			
Note 5:	Subtest 1 is not used when testing a	with 30kHz SS	B SCS			

A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only red	quired to be tested in one of the supported test configurations in each supported band

A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Confin	Unit	Test 1		Test 2	
Parameter	Config	Unit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~3		freq1	freq2	freq1	freq2
	1		10: N _{RB,c} =	= 52	10: N _{RB,0}	= 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	
	1 F		FDD		FDD	
Duplex mode	2		TDD		TDD	
	3		TDD		TDD	
	1		N/A		N/A	
TDD configuration	2		TDDConf.	.1.1	TDDCor	nf.1.1
	3		TDDConf.	.2.1	TDDConf.2.1	
PDSCH Reference	1		SR.1.1 FDD		SR.1.1 FDD	
measurement channel	2		SR.1.1 TDD	-	SR.1.1 TDD	-

			1	00 0 4 505	1	00 0 4 505	
		3		SR.2.1 FDD		SR.2.1 FDD	
RMSI COR	ESET Reference	1	-	CR.1.1 FDD	-	CR.1.1 FDD	-
Channel		2		CR.1.1 TDD	-	CR.1.1 TDD	-
		3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated (CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference (Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
		3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
		1		SSB.1 FI		SSB.1	
SSB config	uration	2		SSB.1 FI		SSB.1	
		3		SSB.2 FI	R1	SSB.2	
OCNG Patt	erns	1~3		OP.1		OP.	1
		1		TRS.1.1 FDD		TRS.1.1	
TRS config	uration	2		TRS.1.1 TDD	-	TRS.1.1 TDD	
		3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP	Configuration	1~3		DLBWP.0 ULBWP.0		DLBWF ULBWF	
Dadiestal	DMD configuration	4.0		DLBWP.		DLBWF	
Dedicated E	BWP configuration	1~3		ULBWP.		ULBWF	
SMTC conf	•	1~3		SMTC.		SMTC	
Time offset and Cell 2	between Cell 1	1~3	μs	3		3	
	of PSS to SSS					1	
	of PBCH DMRS to						
SSS	I I DOI I DIVIRCO LO						
	f PBCH to PBCH						
DMRS							
	of PDCCH DMRS to						
SSS							
	f PDCCH to PDCCH	1~3	dB	0	0	0	0
DMRS	of PDSCH DMRS to	1~3		0	U	U	U
SSS	I PUSCH DIVIKS IU						
	of PDSCH to PDSCH						
DMRS							
EPRE ratio o	of OCNG DMRS to						
SSS ^{Note 1}							
	of OCNG to OCNG						
DMRS Note 1	NR_FDD_FR1_A,						445
	NR_FDD_FR1_A, NR_TDD_FR1_A,						-115
	NR_SDL_FR1_A					1	
	NR_FDD_FR1_B					_	-114.5
Note2	NR_TDD_FR1_C		dBm/15	-94.65		$(N_{oc})_{for}$	-114
N_{oc}	NR_FDD_FR1_D,	1~3	kHz	-94.00			-113.5
	NR_TDD_FR1_D		NI IZ			Channel 2 +8dB)	440
	NR_FDD_FR1_E, NR_TDD_FR1_E					(Gab)	-113
	NR_FDD_FR1_E	1				1	-112
	NR_FDD_FR1_H	1					-111.5
	NR FDD FR1 A,						-115
	NR_TDD_FR1_A,						
NR_SDL_FR1_A							
							-114.5
			dBm/SS	-94.65		$(N_{oc} \text{ for})$	-114
· · oc	NR_FDD_FR1_D,	1,2,4,5	B SCS	300		Channel 2	-113.5
	NR_TDD_FR1_D		- 555			+8dB)	110
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113
	NR_FDD_FR1_G						-112
	NR_FDD_FR1_H	1					-111.5
	1	l	L	1		1	

	NR FDD FR1 A,	ı					440.00
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3		-91.65		$(N_{oc} ext{ for } Channel 2 + 8dB)$	-112.00 -112.50 -112.00 -111.50 -111.00 -110.00 -110.50
	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	10	10	13	-3
SS-	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_D, NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	1,2,4,5	dBm/SC	-84.65	-84.65		-118.00 -117.50 -117.00 -116.50 -116.00 -115.00 -114.50
RSRP ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	FDD_FR1_H FDD_FR1_A, TDD_FR1_A, SDL_FR1_A, SDL_FR1_B TDD_FR1_C FDD_FR1_D, TDD_FR1_B FDD_FR1_B FDD_FR1_B FDD_FR1_B FDD_FR1_B FDD_FR1_B FDD_FR1_B TDD_FR1_B FDD_FR1_B FDD_FR1_B TDD_FR1_C FDD_FR1_C FDD_FR1_B TDD_FR1_C FDD_FR1_B TDD_FR1_C FDD_FR1_B TDD_FR1_B FDD_FR1_B FDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_A, SDL_FR1_A FDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B TDD_FR1_B	Ø	-81.65	(RSRP for Cell 2 +25dB)	-115.00 -114.50 -114.00 -113.50 -113.00 -112.00 -111.50	
Io ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	1,2,4,5	dBm/ 9.36MH z	-56.28		Io for Channel 2 +19.75dB)T	-85.28 -84.78 -84.28 -83.78 -83.28 -82.28 -81.78
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3	dBm/ 38.16M Hz	-50.19		Io for Channel 2 +19.75dB)T	-79.19 -78.69 -78.19 -77.69 -77.19 -76.19 -75.69
1	$\hat{\mathcal{E}}_s/N_{oc}$	1~3	dB	10	10	13	-3
	ation condition	1~3	-	AWGN		AWG	SN
Antenna	a configuration	1~3		1x2		1x2	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be
	constant over subcarriers and time and shall be modelled as AWGN of appropriate power
	for N_{oc} to be fulfilled.
Note 3:	RSRP and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna nort

A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

A.6.7.1.3 Void

A.6.7.2 SS-RSRQ

A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is o	nly required to be tested in one of the supported test configurations

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Paran	notor	Unit	Test 1		Tes	st 2	Test 3	
Paran	neter	Unit	Cell 1	Cell 2	Cell 1	Cell 2		Cell 2
SSB ARFCN			fre	freq1 freq1 freq1		q1		
Duplex mode	Config 1				FD	D		
Duplex mode	Config 2,3				TD	D		
	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					

Gap Pattern ID					0				
	Initial DL BWP				DLBWI	P.0.1			
	Dedicated DL BWP		DLBWP.1.1						
BWP configuration	Initial UL BWP				ULBWI	P.0.1			
	Dedicated UL BWP				DLBWP.1.1 ULBWP.0.1 ULBWP.1.1 Not Applicable SR.1.1				
DRX Cycle		ms			Not App	licable			
	Config 1		SR.1.1 FDD				1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-		-	1	-	
	Config 3		SR2.1 TDD						
	Config 1		CR.1.1 FDD				1 FDD		
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-		-	1 TDD		
	Config 3		CR.2.1 TDD		-		1 TDD		
	Config 1		CCR.1. 1 FDD				1.1 FDD		
Control Channel RMC	Config 2		CCR.1. 1 TDD	-		-	1.1 TDD	-	
	Config 3		CCR.2. 1 TDD				2.1		
OCNG Patterns					OP.	1			
SS-RSSI-Measurement									
SMTC configuration	T								
SSB configuration	Config 1,2								
	Config 3 Config 1,2								
PDSCH/PDCCH subcarrier spacing	Config 3	kHz							
EPRE ratio of PSS to SS					JUKI	72			
EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH D	IRS to SSS PBCH DMRS MRS to SSS								
EPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM	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)		0	0	0	0	0	0	
$N_{oc}^{ m Note2}$ Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C	dBm/15kH z	-8	35	-10	 D1	-11	14 3.5 13	

	1	T	Т	1		1		1	
		NR_FDD_FR1_D, NR_TDD_FR1_D						-11	2.5
		NR_FDD_FR1_E,						1	12
		NR_TDD_FR1_E							
		NR_FDD_FR1_G							11
		NR_FDD_FR1_H NR_FDD_FR1_A,							0.5
		NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B							3.5
		NR_TDD_FR1_C NR_FDD_FR1_D,							13
	Config 3	NR_TDD_FR1_D,		-91		-		-11	2.5
		NR_FDD_FR1_E,						-1	12
		NR_TDD_FR1_E							
		NR_FDD_FR1_G NR_FDD_FR1_H							11 0.5
		NR_FDD_FR1_A,							0.0
		NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B NR_TDD_FR1_C							3.5
	0005-10	NR_FDD_FR1_D,) <u></u>		04		13
	Config 1,2	NR_TDD_FR1_D		-8	35	-10	J1		2.5 12
		NR_FDD_FR1_E,							11
		NR_TDD_FR1_E NR_FDD_FR1_G						-11	0.5
$N_{oc}^{ m Note2}$		NR_FDD_FR1_H	dBm/SCS						
I V oc		NR_FDD_FR1_A,	ubili/303					-1	11
		NR_TDD_FR1_A NR_FDD_FR1_B							0.5
		NR_TDD_FR1_C							10
	Config 3	NR_FDD_FR1_D,		-8	18	_			9.5
	Coming 5	NR_TDD_FR1_D			,0			-10	9.0
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	09
		NR_FDD_FR1_G							08
<u> </u>		NR_FDD_FR1_H						-107.5	
\hat{E}_s/I_{ot}			dB	-1.	76	-4	.7	-546	-5.46
\hat{E}_s/N_{oc}	1	ND 500 504 4	dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A						-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
		NR_TDD_FR1_C						-117	-117
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-82	-82	-103.9	-103.9	-116.5	-116.5
		NR_FDD_FR1_E,						440	440
		NR_TDD_FR1_E						-116	-116
SS-		NR_FDD_FR1_G NR_FDD_FR1_H						-115 -114.5	-115
RSRP ^{Note}		NR_FDD_FR1_A,	dBm/SCS						-114.5
		NR_TDD_FR1_A						-115	-115
		NR_FDD_FR1_B NR_TDD_FR1_C						-114.5 -114	-114.5 -114
	0 " -	NR_FDD_FR1_C		25	25				
	Config 3	NR_TDD_FR1_D		-85	-85	-	-	-113.5	-113.5
		NR_FDD_FR1_E,						-113	-113
		NR_TDD_FR1_E NR_FDD_FR1_G						-112	-112
1	1	NR_FDD_FR1_H						-111.5	-111.5

SS-RSRQ Note3		NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C							
SS-RSRQ	Note3	NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B						-83.5	
		NR_TDD_FR1_C						-83 -82.5	
Config 1,2		NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-50		-70		-82	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-81.5	
		NR_FDD_FR1_G						-80.5	
Io ^{Note3}		NR_FDD_FR1_H						-80	
		NR_FDD_FR1_A, NR_TDD_FR1_A							7.4
		NR_FDD_FR1_B NR_TDD_FR1_C							6.9 6.4
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 38.16MHz	-5	50	-	-		5.9
		NR_FDD_FR1_E, NR_TDD_FR1_E						-75	5.4
		NR_FDD_FR1_G						-74	1.4
		NR_FDD_FR1_H			1				3.9
Propagation	Propagation condition			AWGN	AWGN	AWGN	AWGN	AWG N	AWG N
	onfiguration	as used such that both		1x2	1x2	1x2	1x2	1x2	1x2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 clause 3.5.2.

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

	Config	Description						
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note:	The UE is only	required to be tested in one of the supported test configurations						

Table A.6.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Davama	4	l lmi4	Те	st 1	Tes	st 2	Test 3			
Parame	eter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2		
SSB ARFCN			freq1 freq2 freq1 freq2 freq1 fr							
Duplex mode	Config 1 Config 2,3	4	FDD TDD							
	Config 2,3		Not Applicable							
TDD configuration	Config 2	_			TDDCc					
122 comigaration	Config 3	-	TDDConf.2.1							
	Config 1				10: N _{RB}					
BW _{channel}	Config 2	– MHz			10: N _{RB}	<u> </u>				
_ · · · onamor	Config 3	1			40: N _{RB} ,	<u> </u>				
Gap pattern ID	Config 1,2,3				0					
	Config 1				10: N _{RB}	s,c = 52				
BWP BW	Config 2		10: N _{RB,c} = 52							
	Config 3	1	40: NRB,c = 106							
DRX Cycle	-	ms	Not Applicable							
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-		
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD			
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD			
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD			
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD			
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD			
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	_		
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD			

OCNG Pat	terns					OCNG p	attern 1				
SMTC con	SMTC configuration Config 1,2			SMTC pattern 1							
SWITC COIL	Config 3					SMTC pa	attern 2				
SSB confi	SSB configuration Config 1,2					SSB patter	n 1 in FR				
33B (01111	guration	Config 3				SSB patter	n 2 in FR	1			
PDSCH/PI	PDSCH/PDCCH Config 1,2		1.11-			15 k	15 kHz				
subcarrier	spacing	Config 3	kHz			30 k	Hz				
	EPRE ratio of PSS to SSS										
	of PBCH DMRS		<u> </u>								
	of PBCH to PBC		-								
	of PDCCH DMR of PDCCH to PE		dB	0	0	0	0	0	0		
	of PDSCH DMR		db.	0	U		U	U	O		
EPRE ratio	of PDSCH to PD	SCH	-								
		S to SSS(Note 1)									
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1)									
		NR_FDD_FR1_A									
		NR_TDD_FR1_A									
		NR_SDL_FR1_A]					-11			
		NR_FDD_FR1_B]	-80.18				-115	5.5		
N_{oc}		NR_TDD_FR1_C]					-11	5		
Note2	Config 1,2	NR_FDD_FR1_D	dBm/15kHz			-106					
110102		NR_TDD_FR1_D]					-114	4.5		
		NR_FDD_FR1_E									
		NR_TDD_FR1_E						-11	4		
		NR_FDD_FR1_G						-113			
		NR_FDD_FR1_H						-112	2.5		
		NR_FDD_FR1_A									
		NR_TDD_FR1_A									
		NR_SDL_FR1_A						-11			
		NR_FDD_FR1_B	_					-115			
N_{oc}		NR_TDD_FR1_C						-11	5		
Note2	Config 3	NR_FDD_FR1_D	dBm/15kHz	-86	6.27	-1°	13				
		NR_TDD_FR1_D	-					-114	4.5		
		NR_FDD_FR1_E									
		NR_TDD_FR1_E	-				-11				
		NR_FDD_FR1_G	-					-11			
		NR_FDD_FR1_H						-112	2.5		
		NR_FDD_FR1_A NR_TDD_FR1_A									
		NR_TDD_FR1_A NR_SDL_FR1_A						-11	6		
		NR_FDD_FR1_B	1					-115			
		NR_TDD_FR1_C	1					-11			
	Config 1,2	NR_FDD_FR1_D	1	-80	0.18	-10	06	-11			
	Joining 1,2	NR_TDD_FR1_D			0.10		,,	-114	4.5		
		NR_FDD_FR1_E	1					<u> </u>			
		NR_TDD_FR1_E						-11	4		
A 7		NR_FDD_FR1_G	1					-11			
Noc		NR_FDD_FR1_H	dBm/15kHz					-112			
Note2		NR_FDD_FR1_A	1								
		NR_TDD_FR1_A									
		NR_SDL_FR1_A]					-11	3		
		NR_FDD_FR1_B						-112	2.5		
	Config 3	NR_TDD_FR1_C		_Ω'	3.27	-1 ⁻	10	-11	2		
	Config 3	NR_FDD_FR1_D		-0,	J 1	-'					
		NR_TDD_FR1_D						-111	1.5		
		NR_FDD_FR1_E									
		NR_TDD_FR1_E						-111			
		NR_FDD_FR1_G						-11	0		

NR_FDD_FR1_H							-109.5		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$			dB		.75	-1.		3	-1.75
\hat{E}_s/N_{oc}		ND 500 504 1	dB	-1	.75	-1.	75	3	-1.75
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-113	- 117.7 5
		NR_FDD_FR1_B						-112.5	- 117.2 5
		NR_TDD_FR1_C						-112	- 116.7 5
	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D		-81.93	-81.93	- 107.75	107.75	-111.5	- 116.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.7 5
		NR_FDD_FR1_G						-110	- 114.7 5
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS					-109.5	- 114.2 5
e3		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-110	- 114.7 5
		NR_FDD_FR1_B						-109.5	- 114.2 5
		NR_TDD_FR1_C						-109	113.7 5
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	- 111.75	- 111.75	-108.5	- 113.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.7 5
		NR_FDD_FR1_G						-107	- 111.7 5
		NR_FDD_FR1_H						-106.5	111.2 5
SS-RSRQ ¹	Note3	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76 T
Ic Note?	Confir 4.2	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A	dD~ /000		5 0		02	-83.28	- 85.83
10.40/62	Io ^{Note3} Config 1,2	NR_FDD_FR1_B	dBm/SCS	-	50	-75.83		-82.78	- 85.33
		NR_TDD_FR1_C						-82.28	- 84.83

		NR_FDD_FR1_D NR_TDD_FR1_D						-81.78	- 84.33
		NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	- 83.83
		NR_FDD_FR1_G						-80.28	- 82.83
		NR_FDD_FR1_H						-79.78	- 82.33
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-77.19	- 79.73
		NR_FDD_FR1_B						-76.69	- 79.23
		NR_TDD_FR1_C						-76.19	- 78.73
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D			50	-76	.73	-75.69	- 78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	- 77.73
		NR_FDD_FR1_G						-74.19	- 76.73
		NR_FDD_FR1_H						-73.69	- 76.53
Propagation	n condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna co	onfiguration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 clause 3.5.2.

A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.3 SS-SINR

A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Paran	neter	Unit	Tes		Tes	
SSB ARFCN			Cell 1 fre	Cell 2	Cell 1	Cell 2
	Config 1		116		DD nec	1'
Duplex mode	Config 2,3				DD	
	Config 1			Not Ap	plicable	
TDD configuration	Config 2			TDDC	onf.1.1	
	Config 3			TDDC	onf.2.1	
Downlink initial BWP co	onfiguration			DLBV	VP.0.1	
Downlink dedicated BW	/P configuration			DLBV	VP.1.1	
Uplink initial BWP confi	guration			ULBV	VP.0.1	
Uplink dedicated BWP	configuration			ULBV	VP.1.1	
DRX Cycle configuration	n	ms			plicable	
TRS configuration	Config 1			TRS.1	.1 FDD	
	Config 2				.1 TDD	
	Config 3			TRS.1	.2 TDD	
	Config 1		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-
- Criainioi	Config 3		SR.2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1.1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1. 1 TDD	-	CCR.1.1 TDD	-
	Config 3		CCR.2. 1 TDD		CCR.2.1 TDD	
OCNG Patterns			OP.1			
SS-RSSI-Measuremen			Not Ap	plicable		
SMTC configruation			SMTC.1			
Config 1,2				SSB.	1 FR1	
SSB configuration	Config 3			SSB.	2 FR1	

PDSCH/PI	ЭССИ 	Config 1,2			1	15	
subcarrier		Config 3	kHz			30	
	of PSS to SSS						
EPRE ratio	of PBCH DMR	S to SSS					
	of PBCH to PE						
	of PDCCH DN		.ID			0	_
	of PDCCH to I	PDCCH DMRS	dB	0	0	0	0
	of PDSCH to F		-				
		RS to SSS(Note 1)					
EPRE ratio	of OCNG to O	CNG DMRS (Note 1)					
		NR_FDD_FR1_A,				[-11	16]
		NR_TDD_FR1_A	-				1
		NR_FDD_FR1_B	-			[-11:	-
		NR_TDD_FR1_C NR_FDD_FR1_D,	alDes (4.51.1.1			[-11	
$N_{oc}^{ m Note2}$		NR_TDD_FR1_D,	dBm/15kH z	[-9	90]	[-114	4.0J
		NR_FDD_FR1_E,	-			[-1 ⁻	141
		NR_TDD_FR1_E				ι'	' "
		NR FDD FR1 G				[-11	131
		NR_FDD_FR1_H	1			[-11	_
	Config 1.2			Γ.	201	Same as	Noc for
	Config 1,2			[-%	90]	15 k	Ήz
		NR_FDD_FR1_A,				[-11	131
		NR_TDD_FR1_A					
		NR_FDD_FR1_B				[-11:	_
$N_{oc}^{ m Note2}$		NR_TDD_FR1_C	dBm/SCS				12]
	Config 3	NR_FDD_FR1_D,		3-]	37]	[-111.5]	
		NR_TDD_FR1_D NR_FDD_FR1_E,	-				
		NR TDD FR1 E				[-11	11]
		NR_FDD_FR1_G				[-1]	101
		NR_FDD_FR1_H				[-10	-
\hat{E}_s/I_{ot}			dB	[0]	[-3.19]	[-5.46]	[-5.46]
\hat{E}_s/N_{oc}			dB	[4.54]	[2.66]	[-4]	[-4]
		NR_FDD_FR1_A,				[420]	[420]
		NR_TDD_FR1_A				[-120]	[-120]
		NR_FDD_FR1_B				[-119.5]	[- 119.5]
		NR_TDD_FR1_C				[-119]	[-119]
	Config	NR_FDD_FR1_D,		[-	[-87.34]	[-118.5]	[-
	1,2	NR_TDD_FR1_D		85.46]	[-07.5 -1]	[-110.0]	118.5]
		NR_FDD_FR1_E,				[-118]	[-118]
		NR_TDD_FR1_E	-				
		NR_FDD_FR1_G	-			[-117]	[-117] r
SS- RSRP ^{Not}		NR_FDD_FR1_H	dDm/CCC			[-116.5]	[- 116.5]
e3		NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/SCS			[-117]	[-117]
		NR_FDD_FR1_B]			[-116.5]	[- 116.5]
		NR_TDD_FR1_C	1			[-116]	[-116]
		NR_FDD_FR1_D,	1	[-		[-115.5]	[-
	Config 3	NR_TDD_FR1_D		82.46]	[-84.34]	[]	115.5]
		NR_FDD_FR1_E,	1			[-115]	[-115]
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				[-114]	[-114]
		NR_FDD_FR1_H				[-113.5]	[-
							113.5]

SS-SINR N	ote3	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	dB	[0]	[-3.19]	[-5.46]	[-5.46]	
	Config	NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/	[E	4.51	[-85. [-85. [-84.	.01] .51]	
Io ^{Note3}	1,2	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	9.36MHz	[-54.5]		[-83.51] [-82.51] [-82.01]		
	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/ 38.16MHz	[-48	[-48.41]		41] 91] 41] 91] 41] 41] 91]	
Propagatio	n condition				AV	AWGN		
Antenna co	onfiguration		-		1	x2		

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-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in clause 3.5.2.

A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

	Config Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only	required to be tested in one of the supported test configurations				

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
		Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1	freq2	freq1 FD	freq2	freq1	freq2
Duplex mode	Config 1 Config 2,3				TD			
	Config 1				Not App	olicable		
TDD configuration	Config 2				TDDC	onf.1.1		
	Config 3				TDDC			
Downlink initial BWP con	figuration				DLBW			
Downlink dedicated BWF	configuration				DLBW	P.1.1		
Uplink initial BWP config	uration				ULBW			
Uplink dedicated BWP co	onfiguration				ULBW	P.1.1		
DRX Cycle configuration		ms			Not App			
TRS configuration	Config 1				TRS.1.			
	Config 2				TRS.1.			
	Config 3				TRS.1.	2 TDD		
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD	

OCNG Pat	torne					00) 1		
OCNG Patterns				OP.1 Not Applicable					
SS-RSSI-Measurement			Not Applicable						
SMTC configuration			SMTC.1						
SSB confi	auration	Config 1,2				SSB.1			
335 (01111	guration	Config 3				SSB.2	PFR1		
PDSCH/PI	DCCH	Config 1,2	1.11=			15			
subcarrier	spacing	Config 3	kHz			30			
FPRF ratio	of PSS to SSS	<u> </u>							
	of PBCH DMRS	to SSS							
	of PBCH to PBC								
	of PDCCH DMR		.ID		0	0	0		0
	of PDCCH to PD of PDSCH DMR		dB	0	0	0	0	0	0
FPRF ratio	of PDSCH to PD	SCH							
	of OCNG DMRS								
		NG DMRS (Note 1)							
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B						[-119	
3.7		NR_TDD_FR1_C						[-119] [-118.5]	
N_{oc} Note2	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/15kHz	[-{	80]	[-10	8.5]	[-118]	
		NR_FDD_FR1_E NR_TDD_FR1_E						[-117.5]	
		NR_FDD_FR1_G						[-116.5]	
		NR_FDD_FR1_H						[-116]	
N/	Config 1,2 N			[-80] [-77]		[-108.5] [-105.5]		Same a for 15l	
N _{oc} Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E	dBm/15kHz					[-110 [-11: [-11:	[6] 5.5]
		NR_TDD_FR1_E NR_FDD_FR1_G							
		NR_FDD_FR1_H						[-11 ₄	+.5 <u>]</u> [3]
\hat{E}_s/I_{ot}		dB	[-1.75]	[-1.75]	[20]	[20]	[-4.0]	[-4.0]	
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		dB	[-1	.75]	[2	0]	[-4	.0]
SS- RSRP Note3	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SCS	[-81.75]		[-88.5]		[-123.5] [-123] [-122.5]	

		ND EDD ED4 D				
		NR_FDD_FR1_D NR_TDD_FR1_D				[-122]
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				[-121.5]
		NR_FDD_FR1_G				[-120.5]
		NR_FDD_FR1_H				[-120]
		NR_FDD_FR1_A				[]
		NR_TDD_FR1_A				[-120.5]
		NR_SDL_FR1_A				
		NR_FDD_FR1_B				[-120]
		NR_TDD_FR1_C				[-119.5]
	Config 3	NR_FDD_FR1_D		[-78.75]	[-85.5]	[-119]
		NR_TDD_FR1_D				[]
		NR_FDD_FR1_E				[-118.5]
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				[-117.5]
	l	NR_FDD_FR1_H NR_FDD_FR1_A				[-117]
		NR_TDD_FR1_A				
		NR_SDL_FR1_A			[20]	
		NR_FDD_FR1_B				
		NR_TDD_FR1_C	dB			
SS-SINRNo	ote3	NR_FDD_FR1_D		[-1.75]		[-4.0]
		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				[-90.09]
		NR_SDL_FR1_A		[-49.83]	[-60.5]	
		NR_FDD_FR1_B				[-89.59]
	0	NR_TDD_FR1_C	dBm/			[-89.09]
	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz			[-88.59]
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				[-88.09]
		NR_FDD_FR1_G				[-87.09]
		NR_FDD_FR1_H				[-86.59]
Io ^{Note3}		NR_FDD_FR1_A				[53.55]
		NR_TDD_FR1_A				[-84]
		NR_SDL_FR1_A				
		NR_FDD_FR1_B				[-83.5]
		NR_TDD_FR1_C	dBm/			[-83]
	Config 3	NR_FDD_FR1_D	38.16MHz	[-43.73]	[-54.41]	[-82.5]
		NR_TDD_FR1_D	30. 10.WII 12			[02.0]
		NR_FDD_FR1_E				[-82]
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				[-81]
Dropossiis	n oondition	NR_FDD_FR1_H			A)A/ONI	[-80.5]
	on condition		-		AWGN	
Antenna Co	onfiguration		-		1x2	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at
	each receiver antenna port.
Note 5:	NR operating band groups are as defined in clause 3.5.2.

A.6.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.4 L1-RSRP measurement for beam reporting

A.6.7.4.1 SSB based L1-RSRP measurement

A.6.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.6.7.4.1.1-1.

Table A.6.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.6.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
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
, and the second	3		TDDConf.2.1	TDDConf.2.1
	1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
mededicinent charmer	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
Chamer	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
Reference offamilies	3		CCR.2.1 TDD	CCR.2.1 TDD
	1		SSB.3 FR1	SSB.3 FR1
SSB configuration	2		SSB.3 FR1	SSB.3 FR1
	3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~3		OP.1	OP.1
Initial BWP Configuration	1~3		DLBWP.0.1	DLBWP.0.1
Illitial BVVF Corniguration	1~3		ULBWP.0.1	ULBWP.0.1
	1		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicated BWP configuration	1~3		DLBWP.1.1	DLBWP.1.1
			ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~3 1~3		SMTC.1	SMTC.1
reportConfigType			periodic	periodic
reportQuantity	1~3		ssb-Index-RSRP 2	ssb-Index-RSRP 2
Number of reported RS	1~3		_	_
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1~3	ub		
DMRS				
EPRE ratio of OCNG DMRS to SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
NR_FDD_FR1_A, NR_TDD_FR1_A				-117
NR_FDD_FR1_B				-116.5
N_{oc} NR_TDD_FR1_C				-116.5
	1~3	dBm/15kHz	-04 65	-110
Note2 NR_FDD_FR1_D, NR_TDD_FR1_D	1~ა	UDIII/ IOKEZ	-94.65	-115.5
NR_FDD_FR1_E,				-115
NR_TDD_FR1_E NR_FDD_FR1_G				-114
		l .	l .	

	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2		-94.65	-115.5
	NR_TDD_FR1_D	1,∠		-94.05	-110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
N 7	NR_FDD_FR1_G		dBm/SSB		-114
N_{oc}	NR_FDD_FR1_H NR_FDD_FR1_A,		SCS		-113.5
Notez	NR_TDD_FR1_A				-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,	3		04.65	110 F
	NR_TDD_FR1_D	3		-91.65	-112.5
	NR_FDD_FR1_E,				-112
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-111 -110.5
^ /	NR_FDD_FR1_H				-110.5
\hat{E}_{s}/I_{ot}		1~3	dB	10	-3
	NR_FDD_FR1_A,				-120
	NR_TDD_FR1_A				
	NR_FDD_FR1_B NR_TDD_FR1_C	1,2			-119.5 -119
	NR_FDD_FR1_D,				-119
	NR_TDD_FR1_D			-84.65	-118.5
	NR_FDD_FR1_E,				440
	NR_TDD_FR1_E				-118
SSB	NR_FDD_FR1_G				-117
RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A,	- - -	SCS		-117
	NR_TDD_FR1_A NR_FDD_FR1_B				116 5
	NR_TDD_FR1_C				-116.5 -116
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D	3		-81.65	-115.5
	NR_FDD_FR1_E,				115
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				-87.28
	NR_TDD_FR1_A NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D,	4.0	dBm/9.36	50.00	
	NR_TDD_FR1_D	1,2	MHz	-56.28	-85.78
	NR_FDD_FR1_E,				-85.28
lo Note3	NR_TDD_FR1_E	-			
	NR_FDD_FR1_G NR_FDD_FR1_H				-84.28 -83.78
	NR_FDD_FR1_A,		1		
	NR_TDD_FR1_A				-81.19
	NR_FDD_FR1_B	3	dBm/38.16	-50.19	-80.69
	NR_TDD_FR1_C	3	MHz	-50.18	-80.19
	NR_FDD_FR1_D,				-79.69
	NR_TDD_FR1_D				

	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19	
	NR_FDD_FR1_G				-78.19	
	NR_FDD_FR1_H				-77.69	
\hat{E}_s/N_{oc}		1~3	dB	10	-3	
Propagat	ion condition	1~3		AWGN	AWGN	
Antenna	configuration	1~3		1x2	1x2	
Note 1:	OCNG shall be used s				int total	
Note 2:	transmitted power spectral density is achieved for all OFDM symbols.					
for N_{oc} to be fulfilled. Note 3: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						

RSRP minimum requirements are specified assuming independent interference and noise

A.6.7.4.1.3 Test Requirements

Note 4:

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in sections 10.1.19.1.

A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.6.7.4.2.1 Test Purpose and Environment

at each receiver antenna port.

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
	1		FDD	FDD
Duplex mode	2		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
BWchannel	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
measurement channel	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
Chamici	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
Noticience Onaille	3		CCR.2.1 TDD	CCR.2.1 TDD
	1		SSB.1 FR1	SSB.1 FR1
SSB configuration	2		SSB.1 FR1	SSB.1 FR1
	3		SSB.2 FR1	SSB.2 FR1
OCNG Patterns	1~3		OP.1	OP.1
	1		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
gg.	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
33.1.3	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		cri-RSRP	cri-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0	0
EPRE ratio of PDSCH to PDSCH				
DMRS EPRE ratio of OCNG DMRS to				
SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1				
NR_FDD_FR1_A,				447
NR TOD FR1 A				-117
NR FDD FR1 B	4.0	4D = /4 = 1 1 1	04.05	-116.5
Note2 NR_TDD_FR1_C	1~3	dBm/15kHz	-94.65	-116
NR_FDD_FR1_D,				
NR_TDD_FR1_D				-115.5

	•				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				-117
	NR_TDD_FR1_A				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2		-94.65	-115.5
	NR_TDD_FR1_D	1,2		-94.03	-110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				-113
	NR_FDD_FR1_G		dBm/CSI-RS		-114
N_{oc}	NR_FDD_FR1_H		SCS		-113.5
Note2	NR_FDD_FR1_A,		303		-114
	NR_TDD_FR1_A				-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,	3		-91.65	-112.5
	NR_TDD_FR1_D	١		-91.00	-112.0
	NR_FDD_FR1_E,				-112
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~3	dB	10	-3
	NR_FDD_FR1_A,				400
	NR_TDD_FR1_A				-120
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,	1,2		-84.65	-118.5
	NR_TDD_FR1_D			-04.00	-110.5
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E				-110
CSI-RS	NR_FDD_FR1_G				-117
RSRP	NR_FDD_FR1_H		dBm/CSI-RS		-116.5
Note3	NR_FDD_FR1_A,		SCS		-117
	NR_TDD_FR1_A				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3		-81.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C	1			-86.28
	NR_FDD_FR1_D,	1	dBm/9.36		-00.20
	NR_TDD_FR1_D	1,2	MHz	-56.28	-85.78
	NR_FDD_FR1_E,		1411 12		
lo Note3	NR_TDD_FR1_E	-			-85.28
	NR FDD FR1 G				-84.28
	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A		dBm/38.16	50.40	-81.19
	NR_FDD_FR1_B	3	MHz	-50.19	-80.69
	NR_TDD_FR1_C	1	1411 12		-80.19

NR_FDD_FR1_D, NR_TDD_FR1_D				-79.69		
NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19		
NR_FDD_FR1_G				-78.19		
NR_FDD_FR1_H				-77.69		
\hat{E}_s/N_{oc}	1~3	dB	10	-3		
Propagation condition	1~3		AWGN	AWGN		
Antenna configuration	1~3		1x2	1x2		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total						

- 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.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.19.2.

A.6.7.5 E-UTRAN RSRP

A.6.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.2 for SA inter-RAT E-UTRAN RSRP measurements.

A.6.7.5.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.5.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRP are tested by using the parameters in A.6.7.5.1.2-2 and A.6.7.5.1.2-3.

Table A.6.7.5.1.2-1: Inter-RAT E-UTRAN RSRP supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.5.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Buplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
	Config 1, 4		10: $N_{RB,c} = 52 \text{ (FDD)}$	
BW _{channel}	Config 2, 5	MHz	10: $N_{RB,c} = 52 \text{ (TDD)}$	
	Config 3, 6		40: $N_{RB,c} = 106 \text{ (TDD)}$	
Gap pattern Id			0	
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD	
channel	Config 2, 5		SR.1.1 TDD	
Charlie	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
	Initial DL BWP		DLBWP.0.1	
DIAID C	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern ^{Note1}			OP.1	
SMTC configuration			SMTC.1	
CCD configuration	Config 1, 2, 4, 5		SSB.1 FR1	
SSB configuration	Config 3, 6		SSB.2 FR1	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SS	S			
EPRE ratio of PBCH to PBCH_DM	RS			
EPRE ratio of PDCCH_DMRS to S	SS			
EPRE ratio of PDCCH to PDCCH_	DMRS	dB	0	
EPRE ratio of PDSCH_DMRS to S				
EPRE ratio of PDSCH to PDSCH_	DMRS			
EPRE ratio of OCNG DMRS to SS	S			
EPRE ratio of OCNG to OCNG DM	IRS			
N _{oc} Note2		dBm/15 kHz	-104	
N _{oc} Note2	Config 1, 2, 4, 5		-104	
Nochtone	Config 3, 6	dBm/SCS —	-101	
Ê _s /N _{oc}	<u> </u>	dB	17	
Ê _s /I _{ot} Note3		dB	17	
	Config 1, 2, 4, 5		-87	
SS-RSRP ^{Note3}	Config 3, 6	dBm/SCS	-84	
COD DDNote2	Config 1, 2, 4, 5	ID (000	-87	
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS	-84	
I Note3	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
Io ^{Note3}	Config 3. 6	dBm/38.16 MHz	-52.87	
Propagation condition	Config 3, 6	dBm/38.16 MHz	-52.87 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

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.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 2		
			Test 1	Test 2	
E-UTRA RF channel numb			1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6		TDD		
TDD special subframe	Config 1, 2, 3		N/		
configuration ^{Note1}	Config 4, 5, 6		6		
TDD uplink-downlink	Config 1, 2, 3		N/	<u>/A</u>	
configuration ^{Note1}	Config 4, 5, 6		1		
BW _{channel}		MHz	5 MHz: N		
			10 MHz: N 20 MHz: N		
PDSCH parameters:			20 IVITZ. IV	IRB,c = 100	
DL Reference Measureme	nt Channel ^{Note2}				
PCFICH/PDCCH/PHICH	Config 1, 2, 3		5 MHz: R	? 11 FDD	
parameters:	001111g 1, 2, 0		10 MHz:		
DL Reference			20 MHz: F		
Measurement	Config 4, 5, 6		5 MHz: R		
Channel ^{Note2}	,, ,, ,		10 MHz:		
			20 MHz: F		
OCNG Patterns ^{Note2}	Config 1, 2, 3		5 MHz: O		
			10 MHz: 0	OP.6 FDD	
			20 MHz: O		
	Config 4, 5, 6		5 MHz: O		
			10 MHz: OP.2 TDD		
			20 MHz: (OP.8 TDD	
PBCH_RA					
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA PHICH_RB		4D		`	
PDCCH_RA		dB	(J	
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG RA ^{Note3}					
OCNG_RB ^{Note3}					
CONC_ND	Bands FDD_A Note 9,				
	TDD_A			-117	
	Bands FDD_B1,			-116.5	
	FDD_B2 Note 10				
N _{oc} ^{Note4}	Bands FDD_C, TDD_C	dBm/15kHz	-91.65	-116	
	Bands FDD_D			-115.5	
	Bands FDD_E, FDD_F Note 7, TDD_E			-115	
	Bands FDD_G Note 8			-114	
	Bands FDD_H			-113.5	
Ê _s /N _{oc}		dB	10	-4	
Ê _s /I _{ot} Note5		dB	10	-4	
	Bands FDD_A Note 9, TDD_A			-121	
RSRP ^{Note5}	Bands FDD_B1, FDD_B2 Note 10	dBm/15kHz	-81.65	-120.5	
	Bands FDD_C, TDD_C			-120	
	Bands FDD_D			-119.5	

	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9,			-121
	TDD_A			-121
	Bands FDD_B1,			-120.5
	FDD_B2 Note 10			
SCH_RPNote5	Bands FDD_C, TDD_C	dBm/15kHz	-81.65	-120
0011_1(1	Bands FDD_D	GDIII/ TORT IZ	01.00	-119.5
	Bands FDD_E, FDD_F			-119
	Note 7, TDD_E			_
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9,			-87.76 +
	TDD_A			10log(N _{RB,c} /50)
	Bands FDD_B1,			-87.26 +
	FDD_B2 Note 10			10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C			-86.76 +
	Bands 1 BB_0, 1BB_0			10log(N _{RB,c} /50)
IoNote5	Bands FDD D	dBm/Ch BW	-53.45 +	-86.26 +
	_	abiii, oii bii	10log(N _{RB,c} /50)	10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F			-85.76 +
	Note 7, TDD_E			10log(N _{RB,c} /50)
	Bands FDD_G Note 8			-84.76 +
	24.130 1 22_0			10log(N _{RB,c} /50)
	Bands FDD H			-84.26 +
				10log(N _{RB,c} /50)
	Propagation Condition		AWGN	
Antenna Configuration and	Antenna Configuration and Correlation Matrix		1)	(2

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.5.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRP measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.2.

A.6.7.6 E-UTRAN RSRQ

A.6.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.3 for SA inter-RAT E-UTRAN RSRQ measurements.

A.6.7.6.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.6.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRQ are tested by using the parameters in A.6.7.6.1.2-2 and A.6.7.6.1.2-3.

Table A.6.7.6.1.2-1: Inter-RAT E-UTRAN RSRQ supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.6.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit	C	Cell 1
NR RF channel number				1
Duplex mode	Config 1, 4			FDD
Duplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5			Conf.1.1
	Config 3, 6		TDD	Conf.1.2
	Config 1, 4		10: N _{RB,0}	c = 52 (FDD)
BW _{channel}	Config 2, 5	MHz	10: N _{RB,0}	c = 52 (TDD)
	Config 3, 6			= 106 (TDD)
Gap pattern Id				0
PROOF (Config 1, 4		SR.	1.1 FDD
PDSCH reference measurement	Config 2, 5	Ī	SR.	1.1 TDD
channel	Config 3, 6	T		2.1 TDD
	Config 1, 4			1.1 FDD
CORSET reference channel	Config 2, 5	1		1.1 TDD
	Config 3, 6	†		2.1 TDD
	Initial DL BWP			3WP.0.1
	Dedicated DL BWP			3WP.1.1
BWP configurations	Initial UL BWP			3WP.0.1
	Dedicated UL BWP			3WP.1.1
OCNG pattern ^{Note1}			OP.1	
SMTC configuration			SMTC.1	
<u> </u>	Config 1, 2, 4, 5		SSB.1 FR1	
SSB configuration	Config 3, 6	†	SSB.2 FR1	
EPRE ratio of PSS to SSS	T Coming 0, 0			J
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMR		1		
EPRE ratio of PDCCH_DMRS to SS		1	0	
EPRE ratio of PDCCH to PDCCH_D		dB		
EPRE ratio of PDSCH_DMRS to SS		1		
EPRE ratio of PDSCH to PDSCH_D		-		
EPRE ratio of OCNG DMRS to SSS		-		
EPRE ratio of OCNG to OCNG DMF		-		
NocNote2		dBm/15 kHz		-104
	Config 1, 2, 4, 5			-104
N _{oc} Note2	Config 3, 6	dBm/SCS		-10 1 -101
Ê _s /N _{oc}	Coming 5, 6	dB	17	7
Ê _s /I _{ot} Note3		dB	17	7
	Config 1, 2, 4, 5		-87	-97
SS-RSRQ ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-84	-94
	Config 1, 2, 4, 5		-87	-9 4 -97
SSB_RP ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-84	-9 <i>1</i> -94
	Config 1, 2, 4, 5	dBm/9.36 MHz	-64 -58.96	-68.26
Io ^{Note3}	Config 1, 2, 4, 5	dBm/38.16 MHz		
Propagation condition		UDIII/30.10 IVITZ	-52.87 -62.17 AWGN	
	on Matrix			1x2
Antenna Configuration and Correlation Matrix Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power.				

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

Note 3: Ê_s/I_{ot}, SS-RSRQ, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.6.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit		Cell 2		
			Test 1	Test 2	Test 3	
E-UTRA RF channel numb	er			1		
Duplex mode	Config 1, 2, 3		FDD			
	Config 4, 5, 6			TDD		
TDD special subframe	Config 1, 2, 3			N/A		
configuration ^{Note1}	Config 4, 5, 6			6		
TDD uplink-downlink	Config 1, 2, 3			N/A		
configuration ^{Note1}	Config 4, 5, 6			11		
BWchannel		MHz		5 MHz: $N_{RB,c} = 25$		
				10 MHz: $N_{RB,c} = 5$		
			2	$0 \text{ MHz: } N_{RB,c} = 10$	00	
PDSCH parameters:	1 Ol INIOto?			-		
DL Reference Measureme				5 MUL D 44 EDE		
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDD		
parameters: DL Reference				10 MHz: R.6 FDD		
Measurement	Config 4, 5, 6	-		<u>20 MHz: R.10 FDI</u> 5 MHz: R.11 TDD		
Channel ^{Note2}	Coning 4, 5, 6			3 MHz: R.11 TDD 10 MHz: R.6 TDD		
Chamile				10 MHz: R.0 TDL 20 MHz: R.10 TDI		
OCNG Patterns ^{Note2}	Config 1, 2, 3			MHz: OP.19 FD		
OCIVOT atterns	001111g 1, 2, 3			0 MHz: OP.6 FD		
				0 MHz: OP.14 FD		
	Config 4, 5, 6			MHz: OP.10 TDI		
	J 33g 1, 3, 3			0 MHz: OP.2 TDI		
			2	0 MHz: OP.8 TD	D	
PBCH_RA	•					
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA						
PHICH_RB		dB		0		
PDCCH_RA						
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RANote3						
OCNG_RB ^{Note3}	I B A Note 0			T		
	Bands FDD_A Note 9, TDD_A				-119.5	
	Bands FDD_B1,				-119	
	FDD_B2 Note 10	-				
N _{oc} Note4	Bands FDD_C, TDD_C	dBm/15kHz	-83	-104.70	-118.5	
•	Bands FDD_D	-			-118	
	Bands FDD_E, FDD_F Note 7, TDD_E				-117.5	
	Bands FDD_G Note 8]			-116.5	
	Bands FDD_H				-116	
Ê _s /N _{oc}		dB	-1.75	-4.0	-4.0	
Ê _s /I _{ot} Note5	The state of the state of	dB	-1.75	-4.0	-4.0	
	Bands FDD_A Note 9, TDD_A				-123.5	
RSRP ^{Note5}	Bands FDD_B1, FDD_B2 Note 10	dBm/15kHz	-84.75	-108.70	-123	
	Bands FDD_C, TDD_C				-122.5	
	Bands FDD_D				-122	

	I	l			
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
RSRQ ^{Note5}	Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8	dB	-14.76	-16.25	-16.25
	Bands FDD_H				00.00
	Bands FDD_A Note 9, TDD_A				-90.26 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10				-89.76 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C				-89.26 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53 + 10log(N _{RB,c} /50)	-75.46 + 10log(N _{RB,c} /50)	-88.76 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-88.26 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-87.26 + 10log(N _{RB,c} /50)
	Bands FDD_H				-86.76 + 10log(N _{RB,c} /50)
Propagation Condition				AWGN	
Antenna Configuration and	Correlation Matrix			1x2	
N			.6. 1. 4.11	4 0 4 1 TO 00 04	4 [00]

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 5: Ê_s/I_{ot}, RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.6.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRQ measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.3.

A.6.7.7 E-UTRAN RS-SINR

A.6.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.4 for SA inter-RAT E-UTRAN RS-SINR measurements.

A.6.7.7.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.7.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RS-SINR are tested by using the parameters in A.6.7.7.1.2-2 and A.6.7.7.1.2-3.

Table A.6.7.7.1.2-1: Inter-RAT E-UTRAN RS-SINR supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Buplox mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.1.2	
	Config 1, 4		10: N _{RB,c} = 52 (FDD)	
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)	
	Config 3, 6		40: $N_{RB,c} = 106 \text{ (TDD)}$	
Gap pattern Id			0	
DDCCII reference meseument	Config 1, 4		SR.1.1 FDD	
PDSCH reference measurement	Config 2, 5		SR.1.1 TDD	
channel	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
	Initial DL BWP		DLBWP.0.1	
51415	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern ^{Note1}			OP.1	
SMTC configuration			SMTC.1	
	Config 1, 2, 4, 5		SSB.1 FR1	
SSB configuration	Config 3, 6		SSB.2 FR1	
EPRE ratio of PSS to SSS	<u> </u>			
EPRE ratio of PBCH_DMRS to SSS	3			
EPRE ratio of PBCH to PBCH_DMF	RS	1		
EPRE ratio of PDCCH_DMRS to S	SS			
EPRE ratio of PDCCH to PDCCH_I	OMRS	dB	0	
EPRE ratio of PDSCH_DMRS to SS	SS			
EPRE ratio of PDSCH to PDSCH_D				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DM				
Noc ^{Note2}		dBm/15 kHz	-104	
Noc ^{Note2}	Config 1, 2, 4, 5		-104	
Nocholez	Config 3, 6	dBm/SCS	-101	
Ê _s /N _{oc}	J = , =	dB	17	
Ê _s /I _{ot} Note3		dB	17	
	Config 1, 2, 4, 5		-87	
SS-RS-SINR ^{Note3}	Config 3, 6	dBm/SCS	-84	
COD DDNote2	Config 1, 2, 4, 5	ID (0.00	-87	
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS	-84	
	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
Io ^{Note3}	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition	, Joining 0, 0	CDITION TO WITE	AWGN	
Antenna Configuration and Correlat	ion Matrix	+	1x2	
Note 1: OCNG shall be used suc				

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

Note 3: Ê_s/I_{ot}, SS-RS-SINR, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit		Cell 2	
			Test 1	Test 2	Test 3
E-UTRA RF channel numb				1	
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6			TDD	
TDD special subframe	Config 1, 2, 3	-		N/A	
configuration ^{Note1}	Config 4, 5, 6			6	
TDD uplink-downlink	Config 1, 2, 3	_		N/A	
configuration ^{Note1}	Config 4, 5, 6			1	
BWchannel		MHz		5 MHz: N _{RB,c} = 25	
				$10 \text{ MHz: } N_{RB,c} = 5$	
DDCCII noromotoro			2	$0 \text{ MHz: } N_{RB,c} = 10$)()
PDSCH parameters: DL Reference Measuremer	et ChannalNote2			-	
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDD	`
parameters:	Corning 1, 2, 3			3 MHz: R.11 FDD 10 MHz: R.6 FDD	
DL Reference				20 MHz: R.10 FDI	
Measurement	Config 4, 5, 6	-		5 MHz: R.11 TDD	
Channel ^{Note2}	Coming 4, 5, 6			10 MHz: R.6 TDD	
Ond mor				20 MHz: R.10 TDI	
OCNG Patterns ^{Note2}	Config 1, 2, 3			MHz: OP.19 FD	
CONC Fallonio	301111g 1, 2, 0			0 MHz: OP.6 FD	
				0 MHz: OP.14 FD	
	Config 4, 5, 6			MHz: OP.10 TD	
	3 , -, -		1	0 MHz: OP.2 TDI	D
			2	0 MHz: OP.8 TD	D
PBCH_RA					
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB		dB		0	
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}	T			T	T
	Bands FDD_A Note 9, TDD_A				-119.5
	Bands FDD_B1, FDD_B2 Note 10				-119
		-			110 5
N _{oc1} Note4	Bands FDD_C, TDD_C Bands FDD_D	dBm/15kHz	-88	-108.50	-118.5 -118
	Bands FDD_E, FDD_F				-117.5
	Note 7, TDD_E	-			
	Bands FDD_G Note 8	-			-116.5
	Bands FDD_H				-116
	Bands FDD_A Note 9, TDD_A				-113.5
	Bands FDD_B1,				-113
N _{oc2} Note4a	FDD_B2 Note 10	dBm/15kHz	-82	-114.5	
	Bands FDD_C, TDD_C				-112.5
	Bands FDD_D	-			-112
	Bands FDD_E, FDD_F Note 7, TDD_E			-111.5	

	Bands FDD_G Note 8				-110.5
	Bands FDD_H				-110
CRS Ê _s /N _{oc1}	·	dB	-1.75	-4.0	-4.0
CRS É _s /I _{ot} Note5		dB	-1.75	-4.0	-4.0
	Bands FDD_A Note 9, TDD_A				-123.5
	Bands FDD_B1, FDD_B2 Note 10				-123
RSRP ^{Note5}	Bands FDD_C, TDD_C	dBm/15kHz	-89.75	-88.50	-122.5
NONF	Bands FDD_D	ubili/15ki12	-09.75	-00.50	-122
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
	Bands FDD_A Note 9, TDD_A				
	Bands FDD_B1, FDD_B2 Note 10		-1.75	20	
RS-SINR ^{Note5}	Bands FDD_C, TDD_C	-10			4.0
K9-SINK	Bands FDD_D	dB	-1./5	20	-4.0
	Bands FDD_E, FDD_F Note 7, TDD_E				
	Bands FDD_G Note 8				
	Bands FDD_H				
	Bands FDD_A Note 9, TDD_A				-93.48 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10				-92.98 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C				-92.48 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53.79 + 10log(N _{RB,c} /50)	-60.56 + 10log(N _{RB,c} /50)	-91.98 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-91.48 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-90.48 + 10log(N _{RB,c} /50)
	Bands FDD_H				-89.98 + 10log(N _{RB,c} /50)
Propagation Condition				AWGN	•
Antenna Configuration a	and Correlation Matrix			1x2	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc1 to be fulfilled.

Note 4a: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers other than CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc2 to be fulfilled.

Note 5: CRS Ê_s/I_{ot}, RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].

Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 8: Except Band 29.

Note 9: Except Band 32, Band 75 and Band 76.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel

bandwidth within 1475.9-1510.9 MHz.

A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

A.7 NR standalone tests with one or more NR cells in FR2

A.7.1 SA: RRC_IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

A.7.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.7.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.1.2-1: Supported test configurations

	Configuration	Description				
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only required to be tested in one of the supported test configurations.					

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment		
La Maria	A -40 II		configuration	0-114			
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, 2	1			
Time offse	t between cells		1, 2	3 μs	Synchronous cells		
Access Ba	Access Barring Information		1, 2	Not Sent	No additional delays in random access procedure.		
SSB config	guration		1	SSB.1 FR2			
			2	SSB.2 FR2			
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 configuration index			1, 2	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2		
rangeToBe	rangeToBestCell		1, 2	Not configured			
T1		S	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2		
T2	T2		1, 2	135	T2 needs to be defined so that cell re- selection reaction time is taken into account.		
Т3		S	1, 2	35	T3 needs to be defined so that cell re- selection reaction time is taken into account.		

Table A.7.1.1.2-3: 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	Т3	
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1				
PDSCH RMC		1	SR.3.1 TDD				N/A		
configuration		2	SR.3.1 TDD			1			
RMSI CORESET		1	CR.3.1 TDD				R.3.1 TDE		
RMC configuration		2	C	R.3.1 TDD)	CR.3.1 TDD			
Dedicated CORESET		1	C	CR.3.1 TDI)	CCR.3.1 TDD			
RMC configuration		2	C	CR.3.1 TDI)	CCR.3.1 TDD			
OCNG Pattern		1, 2	OP.1 d	lefined in A	.3.2.1	OP.1 defined in A.3.2.1			
Initial DL BWP		1, 2	Е	DLBWP.0.1		DLBWP.0.1			
configuration									
Initial UL BWP		1, 2	L	JLBWP.0.1		J	ULBWP.0.1		
configuration									
RLM-RS		1, 2		SSB		SSB			
Qrxlevmin	dBm/SCS	1		-140		-140			
		2		-137		-137			
Pcompensation	dB	1, 2	0		0				
Qhysts	dB	1, 2	0		0				
Qoffsets, n	dB	1, 2		0		0			
Cell_selection_and_		1, 2							
reselection_quality_			SS-RSRP		SS-RSRP				
measurement									
AoA setup		1, 2	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1				
			•		-				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	17	-3.09	2.83	-infinity	2.83	-3.09	
		2							
N_{oc} Note2	dBm/SCS	1			-98				
1 v oc		2	-95						
N_{oc} Note2	dBm/15 kHz	1	-107						
		2							
\hat{E}_s/N_{oc}	dB	1	17	14	17	-infinity	17	14	
		2							
SS-RSRP Note3	dBm/SCS	1	-81	-84	-81	-infinity	-81	-84	
		2	-78	-81	-78	-infinity	-78	-81	
lo	dBm/95.04 MHz	1	-51.93	-50.19	-50.19	-51.93	-50.19	-50.19	
		2	-51.93	-50.19	-50.19	-51.93	-50.19	-50.19	
Treselection	S	1, 2	0	0	0	0	0	0	
SintrasearchP	dB	1, 2	50 50						
Propagation		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.7.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

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; 1280 ms is assumed in this test case.

This gives a total of 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

A.7.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.7.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell					
1	120 kHz SSB SCS, 100 MHz bandwidth,	120 kHz SSB SCS, 100 MHz bandwidth, TDD					
	TDD duplex mode	duplex mode					
2	240 kHz SSB SCS, 100 MHz bandwidth,	240 kHz SSB SCS, 100 MHz bandwidth, TDD					
	TDD duplex mode	duplex mode					
Note: The UE is of	Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment				
Initial condition	Active cell		1, 2	Cell2	The UE camps on cell 2 in the initial phase and during T1 period the UE reselects to cell 1				
T1 end	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1				
condition	Neighbour cells		1, 2	Cell2	during T1				
T3 end condition	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2 with higher priority during T3				
RF Channe	el Number		1, 2	1, 2					
Time offse	t between cells		1, 2	3 μs	Synchronous cells				
Access Ba	Access Barring Information		1, 2	Not Sent	No additional delays in random access procedure.				
SSB config	guration		1	SSB.1 FR2					
			2	SSB.2 FR2					
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 configuration index			1, 2	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2				
rangeToBestCell			1, 2	Not configured					
T1		S	1, 2	35	T1 needs to be defined so that cell re- selection reaction time is taken into account.				
T2		S	1, 2	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.				
Т3		S	1, 2	95	T3 needs to be defined so that cell reselection reaction time is taken into account.				

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1 T1 T2 T3		Cell 2				
		configuration			T1 T2 T3				
TDD configuration		1, 2	Т	DDConf.3.1		Т	DDConf.3.	1	
PDSCH RMC		1, 2	SR.3.1 TDD		N/A				
configuration									
RMSI CORESET		1, 2	C	R.3.1 TDD		CR.3.1 TDD			
parameters									
RMSI CORESET		1, 2	C	CR.3.1 TDI)	CCR.3.1 TDD			
RMC configuration									
OCNG Pattern		1, 2 1, 2		defined in A	.3.2.1	OP.1 defined in A.3.2.1			
Initial DL BWP		1, 2		DLBWP.0.1		DLBWP.0.1			
configuration									
Initial UL BWP		1, 2	J	JLBWP.0.1		J	JLBWP.0.1	1	
configuration									
RLM-RS		1, 2		SSB		SSB			
Qrxlevmin	dBm/SCS	1		-140			-140		
		2		-137		-137			
Pcompensation	dB	1, 2	0			0			
Qhysts	dB	1, 2	0			0			
Qoffset _{s, n}	dB	1, 2	0			0			
Cell_selection_and_		1, 2							
reselection_quality_			SS-RSRP		SS-RSRP				
measurement									
AoA setup		1, 2			Setup 1 defined in A.3.15.1				
			Setup 1 defined in A.3.15.1						
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$	dB	1	15 15 15		-3	-infinity	13		
L _s / L _{ot}		2							
3.7	dBm/SCS	1	-98			J.	<u>l</u>	ı	
N_{oc} Note2	42, 555	2	-95						
3.7	dBm/15 kHz	1			-107				
$N_{_{OC}}$ Note2	abilit to Kill	2	-107						
\hat{E}_s/N_{oc}	dB	1	15	15	15	-3	-infinity	13	
E_s/IV_{oc}	uD	2	10	10	10			10	
SS-RSRP Note3	dBm/SCS	1	-83	-83	-83	-101	-infinity	-85	
00-10101	dDill/000	2	-80	-80	-80	-98	-infinity	-82	
lo	dBm/95.04 MHz	1	-53.88	-53.88	-53.88	-67.25	-infinity	-55.80	
	GDITI/OU.UT IVII IZ	2	-53.88	-53.88	-53.88	-67.25	-infinity	-55.80	
Treselection	S	1, 2	0	0	0	0	0	0	
SnonintrasearchP	dB	1, 2	50		Not sent				
Thresh _{x, high}	dB	1, 2			48				
Thresh _{serving, low}	dB	1, 2	48 44		40				
Thresh _{x, low}	dB	1, 2	50			50			
	UD	1, 2	AWGN		50				
Propagation		1,∠	AWGN						
Condition									

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers Note 2:

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

Note 3: parameters themselves.

A.7.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

Thigher_priority_search See clause 4.2.2.7

T_{evaluate, NR inter} See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 27 s.

A.7.2 SA: RRC_INACTIVE state mobility

A.7.3 RRC_CONNECTED state mobility

A.7.3.1 Handover

A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

Config	Description
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is onl	y 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		dBm	[-120]	
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	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter	Unit	Cell 1		Cell 2	
Farameter	Onit	"" T1	T2	T1	T2
NR RF Channel Number		1		2	2

Config 1 Config 2,3		TDD		
		טטו	TDD	
Config 1		Not Applicable	TDDConf.3.1	
Config 2		TDDConf.1.1	TDDConf.3.1	
Config 3		Not Applicable TDDConf.3.1 TDDConf.1.1 TDDConf.3.1 TDDConf.2.1 TDDConf.3.1 10: NRB,c = 52 100: NRB,c = 66 40: NRB,c = 106 100: NRB,c = 66 40: NRB,c = 106 100: NRB,c = 66 Not Applicable SR3.1 TDD SR.1.1 FDD SR3.1 TDD SR.1.1 TDD SR3.1 TDD CR.1.1 FDD CR3.1 TDD CR.1.1 FDD CR3.1 TDD CR.1.1 TDD CR3.1 TDD CR.1.1 TDD CR3.1 TDD CR.1.1 TDD CR3.1 TDD CR.1.1 TDD CR3.1 TDD OCNG pattern 1 SSB.1 FR2 SSB.1 FR1 SSB.1 FR2 SSB.2 FR1 SSB.1 FR2 SMTC.1 SMTC.1 SMTC.1 SMTC.1 SMTC.2 SMTC.1 SMTC.2 SMTC.1 SKB.1 FR2 SWB.2 HAZ SWB.2 HAZ 120 kHz		
Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66	
Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66	
1	ms		plicable	
Config 1		SR.1.1 FDD	SR3.1 TDD	
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	
Config 2		CR.1.1 TDD	CR3.1 TDD	
Config 3		CR2.1 TDD	CR3.1 TDD	
		OCNG p	pattern 1	
Config 1,2		SSB.1 FR1	SSB.1 FR2	
Config 3		SSB.2 FR1	SSB.1 FR2	
Config 1,2		SMTC.1	SMTC.1	
Config 3		SMTC.2	SMTC.1	
Config 1,2		15 kHz	120 kHz	
Config 3	T KH2	30 kHz	120 kHz	
Config 1,2	1.11_	15 kHz	120 kHz	
Config 3	KHZ	30 kHz	120 kHz	
			FR2 PRACH configuration	
Config 1			-	
Config 2		TRS.1.1 TDD	TRS.2.1 TDD	
Config 3		TRS.1.2 TDD	TRS.2.1 TDD	
T : - :			-	
BWP				
Dedicated UL BWP		ULBWP.1.1	ULBWP.1.1	
SS				
	dB	0	0	
	-			
	Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1 Config 2 Config 3 Initial DL BWP Dedicated DL BWP Dedicated UL BWP	Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1,2 Config 3 Config 1 Config 3 Config 3 Initial DL BWP Dedicated DL BWP Initial UL BWP Dedicated UL BWP SS RS to SSS PBCH DMRS dB	Config 2	

EPRE ratio	o of PDCCH to PDCCH DMRS				
EPRE ratio	o of PDSCH DMRS to SSS				
EPRE ratio	EPRE ratio of PDSCH to PDSCH				
EPRE ratio	o of OCNG DMRS to SSS(Note 1)				
EPRE ratio	o of OCNG to OCNG DMRS (Note				
1)					
$N_{oc}^{\rm Note2}$		dBm/15kH		-10	4.7
1 oc	TV _{oc}				
Note2	Config 1,2			-95.7	
IV _{oc}	N _{oc} Note2 Config 3			-95.7	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	Link only, see clause A.3.7A	-Infinity	10
\hat{E}_s/N_{oc}		dB		-Infinity	10
IoNote3	Config 1,2	dBm/ BW		-66.7	-55.4
10	Config 3	dBm/ BW		-66.7	-55.4
Propagation	on condition	-		AW	GN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than [562] ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = [10] ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = [552]$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.5.2.

This gives a total of [562] ms.

A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the

UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Pai	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	[-120]	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	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	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Down	meter	Unit	Ce	II 1	Cell 2		
Para	imeter	Unit	T1	T2	T1	T2	
NR RF Channel Number				1 1			
Duplex mode				TD	_		
TDD configuration				TDDC			
BW _{channel}		MHz		100: N _R			
BWP BW		MHz		100: N _R	$_{B,c} = 66$		
DRx Cycle		ms		Not App			
PDSCH Reference me				SR3.1			
CORESET Reference	Channel			CR3.1	I TDD		
OCNG Patterns				OCNG p	attern 1		
SMTC Configuration			SMTC pattern 1				
SSB Configuration			SSB.1 FR2				
PDSCH/PDCCH subc	arrier spacing	kHz	120 kHz				
PUCCH/PUSCH subc	arrier spacing	kHz	120 kHz				
PRACH configuration			FR2 PRACH configuration 1				
TRS configuration			TRS.2.1 TDD				
TCI configuration			CSI-RS.Config.0				
BWP configuration	Initial DL BWP			DLBW			
	Dedicated DL BWP			DLBW			
	Initial UL BWP			ULBWP.0.1			
	Dedicated UL BWP			ULBW	/P.1.1		
EPRE ratio of PSS to							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH		dB	()	0		
EPRE ratio of PDCCH							
EPRE ratio of PDSCH							
EPRE ratio of PDSCH	I to PDSCH						

EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note						
1)	0 01 OCNG 10 OCNG DIVIRS (Note					
$N_{oc}^{ m Note2}$		dBm/15kH z	TBD		TBD	
Note2	Config 1,2	dBm/SCS	TBD		TBD	
1 v _{oc}	N_{oc}^{Note2} Config 3		TBD		TBD	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD	TBD	TBD	TBD
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		TBD	TBD	TBD	TBD
IoNote3	Config 1,2	dBm/ BW	TBD	TBD	TBD	TBD
10	Config 3	dBm/ BW	TBD	TBD	TBD	TBD
Propagation	on condition	-		AW	'GN	•

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 382 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 372 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.4.2.$

This gives a total of 382 ms.

A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	[-120]	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring 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	

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

Parameter		Unit	Cel	II 1	Cell 2		
Pala	ineter	Onit	T1	T2	T1	T2	
NR RF Channel Numl	oer		1 2				
Duplex mode			TDD				
TDD configuration				TDDC			
BW _{channel}		MHz			$_{B,c} = 66$		
BWP BW		MHz		100: N _R	$_{B,c} = 66$		
DRx Cycle		ms		Not App	olicable		
PDSCH Reference me	easurement channel			SR3.1	TDD		
CORESET Reference	Channel			CR3.1	I TDD		
OCNG Patterns				OCNG p	attern 1		
SMTC Configuration				SMTC p	attern 1		
SSB Configuration				SSB.1	1 FR2		
PDSCH/PDCCH subc	arrier spacing	kHz	120 kHz				
PUCCH/PUSCH subc	arrier spacing	kHz	120 kHz				
PRACH configuration	·		FR2 PRACH configuration 1				
TRS configuration			TRS.2.1 TDD				
TCI configuration			CSI-RS.Config.0				
BWP configuration	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP			DLBW	/P.1.1		
	Initial UL BWP			ULBW	/P.0.1		
	Dedicated UL BWP			ULBW	/P.1.1		
EPRE ratio of PSS to							
EPRE ratio of PBCH I	DMRS to SSS						
EPRE ratio of PBCH t							
EPRE ratio of PDCCH	EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		dB		1	0		
EPRE ratio of PDSCH DMRS to SSS		QD		'	0		
EPRE ratio of PDSCH							
	DMRS to SSS(Note 1)						
	to OCNG DMRS (Note						
1)							

$N_{oc}^{ m Note2}$		dBm/15kH z	TBD		TBD		
Note2	Note2 Config 1,2		TBD		TBD		
$N_{oc}^{ m Note2}$	Config 3	dBm/SCS	TBD		TBD		
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	TBD	TBD	TBD	TBD	
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		TBD	TBD	TBD	TBD	
Io ^{Note3}	Config 1,2	dBm/ BW	TBD	TBD	TBD	TBD	
10,10,00	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_{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 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 702 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 692$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 702 ms.

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Chann	el Number		1	1	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	·
SMTC con	figuration		1	SMTC	
	-			pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co	PRACH configuration index		1	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	T1		1	5	
T2	T2		1	1600	Time for the UE to detect RLF
T3	T3		1	3	

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1 T2 T3			T1	T2	T3
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC		1	S	R.3.1 TDD)		N/A	
configuration								
RMSI CORESET		1	C	R.3.1 TDD)	(CR.3.1 TDE)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 TDI	D	С	CR.3.1 TD	D
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
PDSCH/PDCCH TCI		1	7	ΓCI.State.2			N/A	
state								
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP		1		DLBWP.0.1		DLBWP.0.1		
configuration								
Initial UL BWP		1	ι	JLBWP.0.1		ULBWP.0.1		
configuration								
RLM-RS		1		SSB		SSB		
AoA setup		1		defined in A	<u>4.3.15.1</u>	Setup 1 defined in A.3.15.1		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	-3.07	-infinity	-infinity	-5.07	2	2
Note2	dBm/15 kHz	1	-98					
Note2	dBm/SCS	1	-89					
\hat{E}_s/N_{oc}	dB	1	4 -infinity -infinity		2	2	2	
SS-RSRP Note3	dBm/SCS	1	-85 -infinity -infinity -87 -87		-87			
lo	dBm/95.04 MHz	1	-52.94 -55.89 -55.89 -52.94 -55.89 -55.89					
Propagation		1	AWGN					
Condition								

Note 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 $rac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq}=1\,$

 $T_{identify_intra_NR} = 1600 \text{ ms}$

 T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

Config	Description					
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Chann	el Number		1	1, 2	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	·
			1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co	PRACH configuration index		1	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	T1		1	5	
T2	T2		1	1600	Time for the UE to detect RLF
T3		S	1	6	

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T1 T2 T3		T1	T2	Т3
TDD configuration		1	TDDConf.3.1			TDDConf.3.1		
PDSCH RMC		1	S	R.3.1 TDD	1		N/A	
configuration								
RMSI CORESET		1	C	R.3.1 TDD	1		R.3.1 TDE)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 TDI)	С	CR.3.1 TD	D
RMC configuration								
TRS configuration		1	TF	RS.2.1 TDI)		N/A	
PDSCH/PDCCH TCI		1	Т	CI.State.2			N/A	
state								
OCNG Pattern		1	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1		
Initial DL BWP		1	DLBWP.0.1			DLBWP.0.1		
configuration								
Initial UL BWP		1	ULBWP.0.1		ULBWP.0.1			
configuration								
RLM-RS		1		SSB		SSB		
AoA setup		1	Setup 3 o	defined in A	4.3.15.3	Setup 3 defined in A.3.15.3		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	5	-infinity	-infinity	-infinity	-infinity	8
N_{oc} Note2	dBm/15 kHz	1	-98					
N_{oc} Note2	dBm/SCS	1	-89					
\hat{E}_s/N_{oc}	dB	1	5 -infinity -infinity		-infinity	-infinity	8	
SS-RSRP Note3	dBm/SCS	1	-84 -infinity -infinity -infinity -infinity		-81			
lo	dBm/95.04 MHz	1	-53.82 -infinity -infinity -infinity -infinity -51.37					
Propagation		1	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $rac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify_intra_NR} = 1600 \text{ ms}$

 $T_{identify_inter_NR} = 2080 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description					
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1	
Time offset	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310	T310		1	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR2	
SMTC conf			1	SMTC pattern 1	
DRX cycle	length	S	1	OFF	
	PRACH configuration index		1	87	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1	5	
T2	T2		1	6	Time for the UE to detect RLF
T3		S	1	5	

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1		Cell 2				
		configuration	T1 T2 T3		T1	T2	Т3		
TDD configuration		1	TDDConf.3.1			Т	TDDConf.3.1		
_		1	S	R.3.1 TDD)		N/A		
RMSI CORESET		1	C	R.3.1 FDD)		CR.3.1 FDE)	
RMC configuration									
Dedicated CORESET		1	C	CR.3.1 FD	D	С	CR.3.1 FD	D	
RMC configuration									
TRS configuration		1	TI	RS.2.1 TDI)		N/A		
TCI state		1	CS	I-RS.Confiç	g.0		N/A		
OCNG Pattern		1	OP.1 d	lefined in A	3.2.1	OP.1 c	defined in A	.3.2.1	
Initial DL BWP		1		LBWP.0.1		DLBWP.0.1			
configuration									
Initial UL BWP		1	L	JLBWP.0.1		ULBWP.0.1			
configuration									
RLM-RS		1		SSB		SSB			
AoA setup		1	Setup 1	defined in A	4.3.15.1	Setup 1 defined in A.3.15.1			
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	5	-infinity	-infinity	-infinity	-infinity	5	
N_{oc} Note2	dBm/SCS	1	-98						
N_{oc} Note2	dBm/15 kHz	1	-89						
\hat{E}_s/N_{oc}	dB	1	5	-infinity	-infinity	-infinity	-infinity	5	
SS-RSRP Note3	dBm/SCS	1	-93	-infinity	-infinity	-infinity	-infinity	-93	
lo	dBm/95.04 MHz	1	-62.82	-infinity	-infinity	-infinity	-infinity	-62.82	
Propagation		1	AWGN						
Condition									

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $\frac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.7.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

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

Where:

 T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 3520 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.2 Random Access

A.7.3.2.2.1 Contention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capble of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode

Note 2:

void.

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Paramet	Parameter		Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 1 in FR2	As defined in A.3.10, except for for number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per SS	-burst		2	Different from the definition in A.3.10
SS/PBCH block index			0,1	Different from the definition in A.3.10
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
OCNG Pattern Note 1			OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note 2	Config 1,2		SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Number			1	
EPRE ratio of PSS to SS	SS	dB		
EPRE ratio of PBCH_DM	MRS to SSS	dB		
EPRE ratio of PBCH to 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.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

	Parameter	Unit	Test-1	Comments	
AoA setup			Setup 2b	As defined in A.3.15.2.2.	
SSB with index 0	SSB_RP	dB	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp-ThresholdSSB	
SSB with index 1	SSB_RP	dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-</i> <i>ThresholdSSB</i>	
$P_{\mathrm{CMAX,f,c}})$	JE transmitted power (dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.	
PRACH Con	ifiguration		FR2 PRACH configuration 1	As defined in A.3.8.3.	
preambleRe	ceivedTargetPower	dBm	-60		
Propagation	Condition	-	AWGN		
Note 1: N	o articial noise is applied in the	nis test.			

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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in subclause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capble of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description				
1	NR PSCell/SCell 120 kHz SSB SCS, 50 MHz bandwidth, TDD duplex mode				

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter	Unit	Test-1	Test-2	Comments

SSB Configuration	Config 1,2		SSB pattern 1 in FR2	SSB pattern 1 in FR2	As defined in A.3.10, except of Number of SSBs per SS-burst and SS/PBCH block index as below
Number of SSBs per	SS-burst		2	2	Different from the definition in A.3.10
SS/PBCH block inde	х		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	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.X TDD	SR3.X TDD	As defined in A.3.1.1.
NR RF Channel Num	ber		1	1	
EPRE ratio of PSS to	SSS	dB			
EPRE ratio of PBCH	_DMRS to SSS	dB			
EPRE ratio of PBCH PBCH_DMRS	to	dB			
EPRE ratio of PDCCH_DMRS to SSS		dB	0	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS		dB			
EPRE ratio of PDSC PDSCH_DMRS	H to	dB			

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Table A.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			Setup 2b	Setup 2b	As defined in A.3.15.2.2.	
SSB with index 0		dB	[10] dB larger than SSB_RP for SSB index 1	[10] dB larger than SSB_RP for SSB index 1	SSB with index 0 is signalled to be above configured rsrp-ThresholdSSB	
SSB with index 1		dB	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	Minimum SSB_RP value is dependent on band and power class as specified for spherical coverage AoA in Table B.2.2-2	SSB with index 1 is signalled to be below configured <i>rsrp-</i> <i>ThresholdSSB</i>	
Configured UE transmitted power ($P_{\mathrm{CMAX,f,c}}$)		dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2.	
PRACH Configuration		-	FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3.	
preambleReceivedTargetPow er		dBm	-60	-60		
Propagation C	Condition	-	AWGN	AWGN		

Note 1: No articial noise is applied in this test.

Note 2: void.

A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.1 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in 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 TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Subclause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Subclause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message containing the relevant system information of Cell 2 shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	3	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Cel	II 1	Cell 2	
Farameter	Onit	T1	T2	T1	T2
NR RF Channel Number		1			2
Duplex mode			TD	DD	
TDD configuration			TDDC	onf.3.1	
BW _{channel}	MHz		100: N _R	$_{B,c} = 66$	
BWP BW	MHz		100: N _R	$_{B,c} = 66$	
DRx Cycle	ms	Not Applicable			
PDSCH Reference measurement channel		SR3.1 TDD			
CORESET Reference Channel			CR3.1	I TDD	
OCNG Patterns			OCNG p	attern 1	
SMTC configuration			SMTC	.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz		120	kHz	
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz			
PRACH configuration		FR2 PRACH configuration 1			
TRS configuration		TRS.2.1 TDD			
TCI configuration			CSI-RS.	Config.0	

BWP configuration Initial DL BWP				DLBWP.0.1				
	Dedicated DL BWP			DLBW	/P.1.1			
	Initial UL BWP		ULBWP.0.1					
	Dedicated UL BWP			ULBW	/P.1.1			
EPRE ratio of P	SS to SSS							
EPRE ratio of P	BCH DMRS to SSS							
EPRE ratio of P	BCH to PBCH DMRS							
EPRE ratio of P	DCCH DMRS to SSS							
EPRE ratio of P	DCCH to PDCCH DMRS	dB		0		0		
EPRE ratio of P	DSCH DMRS to SSS	αБ		U	'	J		
EPRE ratio of P	DSCH to PDSCH							
EPRE ratio of O	CNG DMRS to SSS(Note 1)							
EPRE ratio of O	EPRE ratio of OCNG to OCNG DMRS (Note							
1)								
N_{oc} Note2	$N_{_{OC}}$ Note2		TBD		TBD			
M Nove Cor	fig 1,2		TBD		TBD			
/ V NOTEZ	fig 3	dBm/SCS	TBD		TBD			
\hat{E}_{s}/I_{ot}		dB	TBD	TBD	TBD	TBD		
\hat{E}_s/N_{oc}	\hat{E}_s/N_{oc}		TBD	TBD	TBD	TBD		
Cor Io ^{Note3}	fig 1,2	dBm/ BW	TBD	TBD	TBD	TBD		
Config 3		dBm/ BW	TBD	TBD	TBD	TBD		
Propagation cor	Propagation condition		AWGN					
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: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2040 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

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

where:

 $T_{RRC_procedure_delay} = 110 \text{ ms}$ and is specified in clause 12 in TS 38.331 [2].

 $T_{identify-NR} = 1760 \text{ ms in the test.}$

 $T_{SI-NR} = 0$ ms is assumed, since 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.

 $T_{RACH} = 170 \text{ ms in the test.}$

This gives a total of 2040 ms.

A.7.4 Timing

A.7.4.1 UE transmit timing

A.7.4.1.1 NR UE Transmit Timing Test for FR2

A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz		

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1	Freq1	Freq1
TDD configuration		1	TDDConf.1.2	
BWchannel	MHz	1	100: NRB,c = 66	
Initial BWP Configuration		1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1	DLBWP.1.1 ULBWP.1.1	
TRS Configuration		1	TRS.2.1 TDD	
TCI State		1	CSI-RS.Config.0	
DRx Cycle	ms	1	N/A	DRX.5 ^{Note5}
PDSCH Reference measurement channel		1	SR.3.1 TDD	
RMSI CORESET Reference Channel		1	CR.3.1 TDD	
Dedicated CORESET Reference Channel		1	CCR.3.1 TDD	
OCNG Patterns		1	OP.1	
SSB Configuration		1	SSB.2 FR2	

SMTC Configuration		1,2	SMTC.1	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS	dB	1	0	0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation condition		1	AWGN	
SRS Config		1	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.3.3.5-1
- Note 6: SRS configs are given in Table A.7.4.1.1.3

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2	
Angle of arrival configuration		According to section A.3.15.1		
$N_{oc}^{ m Note1}$	dBm/15kHz ^{Note4}	-112		
N _{oc} Note1	dBm/SCS ^{Note3}	-103		
\hat{E}_s/N_{oc}	dB	4		
SS-RSRP ^{Note2}	dBm/SCS Note4 -99		99	
\hat{E}_{s}/I_{ot}	dB 4		4	
Io ^{Note2}	dBm/95.04 MHz ^{Note4} -68.5		8.5	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Any 10 bit number

Config1 Config 2 Field Comments SRS-ResourceSet srs-ResourceSetId 0 0 srs-ResourceldList 0 0 resourceType Periodic Periodic Usage Codebook Codebook SRS-Resourceld SRS-Resource 0 0 Port1 Port1 nrofSRS-Ports transmissionComb n2 n2 combOffset-n2 0 0 cyclicShift-n2 0 0 0 resourceMapping 0 startPosition resourceMapping n1 n1 nrofSymbols resourceMapping n1 n1 repetitionFactor freqDomainPosition 0 0 freqDomainShift 0 0 freqHopping sl1 sl1 c-SRS freqHopping 0 0 b-SRS freqHopping b-hop groupOrSequenceHopping Neither Neither resourceType Periodic Periodic periodicityAndOffset-p sl1, 0 sl2560, 0 Offset to align with DRx periodicity

Table A.7.4.1.1.3: SRS Configuration for Timing Accuracy Test

Table A.7.4.1.1.1-4: Void

0

0

A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test:

- 1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792

sequenceld

- b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
240	+8*64T _c	+4*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2-3 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX confiured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.7.4.2 UE timer accuracy

A.7.4.3 Timing advance

A.7.4.3.1 SA FR2 timing advance adjustment accuracy

A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

Config	Description	
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	

Table A.7.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	$N_{TA_new} = N_{TA_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS NTA_new = NTA_old + 1024*Tc (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1	
Parameter	Unit	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	
TRS configuration		TRS.2.1 TDD	
TCI configuration		CSI-RS.Config.0	
SMTC configuration		SMTC.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz	
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz	
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS	- - - dB		
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS		0	
EPRE ratio of PDSCH DMRS to SSS	uБ	O O	
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note			
1)			
Propagation condition	-	AWGN	
		allocated and a constant total transmitted power spectral	
density is achieved for all OFDM symbols.			
Note 2: Interference from other cells and no	ise sources no	ot specified in the test is assumed to be constant over	
		VCN of appropriate power for N to be fulfilled	

- subcarriers and time and shall be modelled as AWGN of appropriate power for $\,N_{oc}\,$ to be fulfilled.
- lo levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.
- Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 4:
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Table A.7.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	Test 1	
			T1 T2	
Angle of	arrival configuration		According to s	section A.3.15.1
N_{oc} Note1		dBm/15kHz ^{Note4}		112
N_{oc} Note1		dBm/SCS ^{Note3}		103
\hat{E}_s/N_{oc}		dB		4
SS-RSRI	Note2	dBm/SCS Note4	-	99
$\hat{E}_{_s}/I_{_{ot}}$		dB		4
Io ^{Note2}		dBm/95.04 MHz Note4	-6	8.5
Note 1:	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:	Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 3:	ote 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 4: Note 5:	Equivalent power red	received by an antenna with 0dBi gain at the centre of the quiet zone 0dBi gain antenna at the centre of the quiet zone		

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment		
c-SRS	16	Francisco de comina in discolated		
b-SRS	0	Frequency hopping is disabled		
b-hop	0			
freqDomainPosition	0	Frequency domain position of SRS		
freqDomainShift	0			
groupOrSequenceHopping	neither	No group or sequence hopping		
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots		
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation		
usage	Codebook	Codebook based UL transmission		
startPosition	0	resourceMapping setting. SRS on last		
nrofSymbols	n1	symbol of slot, and 1symbols for SRS		
repetitionFactor	n1	without repetition.		
combOffset-n2	0	transmissionComb setting		
cyclicShift-n2	0	transmissionComb setting		
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission		
Note: For further information see clause 6.3.2 in TS 38.331 [2].				

A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=11.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.7.5 Signaling characteristics

A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Parameter		Unit	Value		
				Test 1	
Active PCell				Cell 1	
RF Channel Nu	mber			1	
Duplex mode		Config 1		TDD	
BWchannel		Config 1		100: N _{RB,c} = 66	
DL initial BWP of	onfiguration	Config 1		DLBWP.0.1	
	NP configuration	Config 1		DLBWP.1.1	
UL initial BWP of		Config 1		ULBWP.0.1	
	NP configuration	Config 1		ULBWP.1.1	
TDD Configurat	ion	Config 1		TDDConf.3.1	
CORESET Refe	rence Channel	Config 1		CR.3.1 TDD	
SSB Configurat	on	Config 1		SSB.1 FR2	
SMTC Configura	ation	Config 1		SMTC.1	
PDSCH/PDCCH	l subcarrier	Config 1		120 KHz	
spacing		9			
PRACH Configu	ıration	Config 1		Table A.3.8.3.4	
	ned as RLM RS	Config 1		0,1	
OCNG paramet				OP.2	
CP length				Normal	
	rix and Antenna Co	onfiguration		2x2 Low	
Out of sync	DCI format	J		1-0	
transmission	Number of Cont	rol OFDM symbols		2	
parameters	Aggregation lev		CCE	8	
•	Ratio of hypothetical PDCCH RE energy to average SSS RE energy		dB	4	
				•	
		etical PDCCH DMRS	dB	4	
		ge SSS RE energy		·	
	DMRS precode			REG bundle size	
	REG bundle siz			6	
DRX		•		OFF	
Gap pattern ID				gp0	
Layer 3 filtering				Enabled	
T310 timer			ms	0	
T311 timer			ms	1000	
N310				1	
N311				1	
CSI-RS for CSI		Config 1		CSI-RS.3.1 TDD	
TCI states for P				TCI.State.2	
CSI-RS for track	king	Config 1		TRS.2.1 TDD	
T1			S	0.2	
T2			S	9.68	
T3			S	9.68	
			S	9.64	

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

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parar	Unit		Test 1		
			T1	T2	Т3
AoA setup			Setup	3 defined in	A.3.15
EPRE ratio of PDCCH DI	MRS to SSS	dB		4	
EPRE ratio of PDCCH to	PDCCH DMRS	dB		0	
EPRE ratio of PBCH DMI	RS to SSS	dB			
EPRE ratio of PBCH to P	BCH DMRS	dB			
EPRE ratio of PSS to SS	S	dB			
EPRE ratio of PDSCH DI	MRS to SSS	dB		0	
EPRE ratio of PDSCH to	PDSCH DMRS	dB			
EPRE ratio of OCNG DM	RS to SSS	dB			
EPRE ratio of OCNG to C	OCNG DMRS	dB			
ssb-Index 0 SNR	Config 1	dB	2	-6	-15
ssb-Index 1 SNR	Config 1		2	-15	-15
SNR on other channels Config 1 and signals		dB		2	•
N_{oc}	Config 1	dBm/15 KHz	-92.1dBm		
Propagation condition			Т	DL-A 30ns 75	Hz
Note 1: OCNG shall be	used such that the re	sources in Cel	l 1 are fully all	ocated and a	constant total

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
rieiu	Value
gapOffset	0

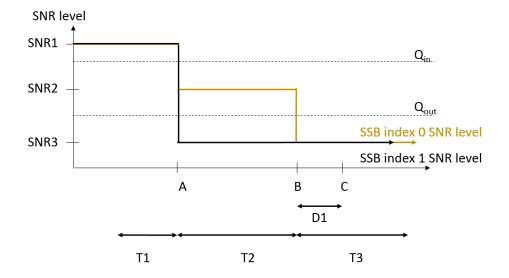


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

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, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

	Parameter	•	Unit	Value		
				Test 1		
Active PCell				Cell 1		
RF Channel Nu	ımber			1		
Duplex mode		Config 1		TDD		
BW _{channel}		Config 1		100: $N_{RB,c} = 66$		
DL initial BWP		Config 1		DLBWP.0.1		
DL dedicated B configuration	WP	Config 1		DLBWP.1.1		
UL initial BWP	configuration	Config 1		ULBWP.0.1		
UL dedicated B		Config 1		ULBWP.1.1		
configuration		Coming 1		025777		
TDD Configura	tion	Config 1		TDDConf.3.1		
CORESET Ref		Config 1		CR.3.1 TDD		
Channel						
SSB Configura		Config 1		SSB.1 FR2		
SMTC Configur		Config 1		SMTC.3		
PDSCH/PDCCl spacing	H subcarrier	Config 1		120 KHz		
PRACH Config	uration	Config 1		Table A.3.8.3.4		
SSB index assi		Config 1		0,1		
RS	g	J Samig		-,.		
OCNG parame	ters			OP.2		
CP length				Normal		
Correlation Mat	rix and Antenna	Configuration		2x2 Low		
In sync	DCI format			1-0		
transmission		ntrol OFDM symbols		2		
parameters	Aggregation le	vel	CCE	4		
		netical PDCCH RE	dB	0		
	Ratio of hypoth	age SSS RE energy	dB	0		
		to average SSS RE	иБ	U		
	energy	to average 555 INL				
	DMRS precode	er granularity		REG bundle size		
	REG bundle si			6		
Out of sync	DCI format			1-0		
transmission	Number of Cor	ntrol OFDM symbols		2		
parameters	Aggregation le		CCE	8		
		netical PDCCH RE	dB	4		
		age SSS RE energy				
	Ratio of hypoth		dB	4		
	energy	to average SSS RE				
	DMRS precode	or granularity		REG bundle size		
	-	· ·		6		
DRX	REG bundle si	<u> </u>		6 OFF		
Gap pattern ID				N.A.		
Layer 3 filtering	 			Enabled		
,						
T310 timer T311 timer		ms ms	4000 1000			
N310			1110	1		
N310 N311			<u>'</u> 1			
CSI-RS for CSI	reporting	Config 1		CSI-RS.3.1 TDD		
	PDCCH/PDSCH	- · · · · g ·		TCI.State.2		
CSI-RS for trac		Config 1		TRS.2.1 TDD		
T1		<u> </u>	S	0.2		
T2			S	0.2		

T3		S	1.88	
T4		S	0.2	
T5		S	3.84	
D1		S	3.8	
Note 1:	Note 1: All configurations are assigned to the UE prior to the start of time period T1.			
Note 2:				

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

Parameter			Test 1				
		T1	T2	T3	T4	T5	
AoA setup		5	Setup 3	defined	in A.3.1	5	
EPRE ratio of PDCCH	I DMRS to SSS	dB			4		
EPRE ratio of PDCCH	I to PDCCH DMRS	dB			0		
EPRE ratio of PBCH [DMRS to SSS	dB					
EPRE ratio of PBCH t	o PBCH DMRS	dB					
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB			0		
EPRE ratio of PDSCH	to PDSCH DMRS	dB					
EPRE ratio of OCNG	DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
ssb-Index 0 SNR	Config 1	dB	2	-6	-15	-4.5	2
ssb-Index 1 SNR	Config 1		2	-15	-15	-15	-15
SNR on other	Config 1	dB			2		
channels and signals							
N	Config 1			(22 1dBn	n	
		5KHz					
	tal transmitted power s	spectral de	ensity is	achieve	ed for al	I OFDM	
- 3							
	Es other	than the	device	under t	est as p	art of	
	1 4			000 D			
						4	
	· ·	cii suppoi	115 417.	UII all D	arius, tr	IE SINK	uuririg
ssb-Index 0 SNR ssb-Index 1 SNR SNR on other channels and signals Noc Propagation condition Note 1: OCNG sha constant to symbols. Note 2: The signal oCNG. Note 3: SNR levels Note 4: The SNR vi	Config 1 Config 1 Config 1 Config 1 Config 1 If be used such that the tal transmitted power such transmitted power such that the tal transmitted power such	dB dB dBm/1 5KHz e resource pectral de to nois testing a	es in Ceensity is than the eratio of UE which	TDL- ell 1 are sachieve e device over the	-15 2 92.1dBn A 30ns fully allo ed for al under to SSS R orts 2R	-15 75Hz cated a I OFDM est as p Es. K on at I	nd a art of

Table A.7.5.1.2.1-4: Void

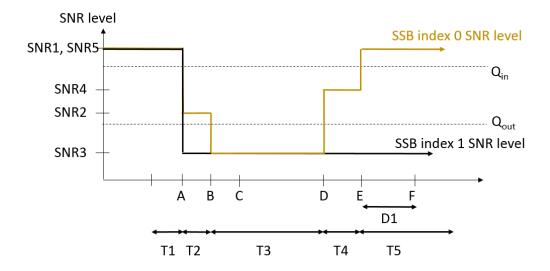


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

	Parameter		Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Nu	ımber			1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
DL initial BWP	configuration	Config 1		DLBWP.0.1
DL dedicated B		Config 1		DLBWP.1.1
configuration				22
UL initial BWP	configuration	Config 1		ULBWP.0.1
UL dedicated B		Config 1		ULBWP.1.1
configuration		Coming 1		025777
TDD Configura	tion	Config 1		TDDConf.3.1
CORESET Ref		Config 1		CR.3.1 TDD
Channel	0101100	ooning i		011.0.1 122
SSB Configuration	tion	Config 1		SSB.1 FR2
SMTC Configur		Config 1		SMTC.1
PDSCH/PDCC		Config 1		120 KHz
spacing	i i subcamor	Coming 1		120 KHZ
PRACH Config	uration	Config 1		Table A.3.8.3.4
SSB index assi		Config 1		0,1
RS	griod do INEIVI	John Grand		0,1
	OCNG parameters			OP.1
CP length	1010			Normal
	trix and Antenna	Configuration		2x2 Low
Out of sync	DCI format	Cornigulation		1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
parameters		hetical PDCCH RE	dB	4
		age SSS RE energy	ub l	•
		hetical PDCCH	dB	4
		to average SSS RE	u.b	·
	energy	to avolago coo me		
	DMRS precod	er granularity		REG bundle size
	REG bundle s			6
DRX Configura		-		DRX.3
Gap pattern ID				N.A.
Layer 3 filtering	1			Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310		5	1	
N311			1	
CSI-RS for CSI reporting Config 1			CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking Config 1			TRS.2.1 TDD	
T1		s	0.2	
T2			s	14.48
T3			s	14.48
D1			s	14.44
	onfigurations are	e assigned to the UE r		
	•	is not transmitted after		Ferree

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

Paramet	Unit		Test 1	•	
			T1	T2	T3
AoA setup		Set	up 1 defined in A	.3.15	
EPRE ratio of PDCCH DM	IRS to SSS	dB		4	
EPRE ratio of PDCCH to I	PDCCH DMRS	dB		0	
EPRE ratio of PBCH DMR	S to SSS	dB			
EPRE ratio of PBCH to PE	3CH DMRS	dB			
EPRE ratio of PSS to SSS	3	dB			
EPRE ratio of PDSCH DM	IRS to SSS	dB		0	
EPRE ratio of PDSCH to F	PDSCH DMRS	dB			
EPRE ratio of OCNG DMF	RS to SSS	dB			
EPRE ratio of OCNG to O	CNG DMRS	dB			
ssb-Index 0 SNR	Config 1	dB	2	-6	-15
ssb-Index 1 SNR	Config 1		2	-15	-15
SNR on other channels	Config 1	dB		2	
and signals				۷	
N_{oc}	Config 1	dBm/15K Hz		-104.7dBm	
Propagation condition	112		TDL-A 30ns 75H	 Z	
11 1 1 0010 1 111	1 1 1 1 1 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 signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

Table A.7.5.1.3.1-4: Void Table A.7.5.1.3.1-5: Void

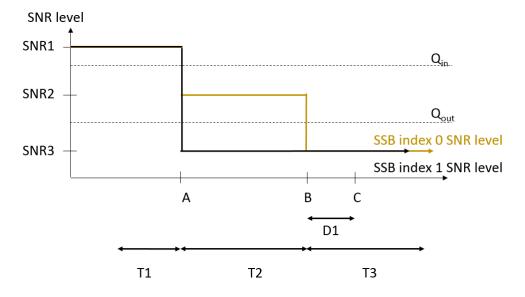


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Editor note: AoA setting needs to be updated.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

	Paramete	r	Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel No	umber			1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
DL initial BWP		Config 1		DLBWP.0.1
DL dedicated E	BWP	Config 1		DLBWP.1.1
configuration				
UL initial BWP		Config 1		ULBWP.0.1
UL dedicated E	BWP	Config 1		ULBWP.1.1
configuration				
TDD Configura		Config 1		TDDConf.3.1
CORESET Ref	erence	Config 1		CR.3.1 TDD
Channel		2 " .		222 / 522
SSB Configura		Config 1		SSB.1 FR2
SMTC Configu		Config 1		SMTC.3
PDSCH/PDCC	H subcarrier	Config 1		120 KHz
spacing				
PRACH Config	uration	Config 1		Table A.3.8.3.4
SSB index ass	igned as RLM	Config 1		0,1
RS				
OCNG parame	ters			OP.1
CP length				Normal
	trix and Antenna	Configuration		2x2 Low
In sync	DCI format			1-0
transmission	Number of Cor	ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
		netical PDCCH RE	dB	0
		age SSS RE energy		
		netical PDCCH	dB	0
		to average SSS RE		
	energy			
	DMRS precode			REG bundle size
	REG bundle si	ze		6
Out of sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE	dB	4
		age SSS RE energy		
		netical PDCCH	dB	4
		to average SSS RE		
	energy	1 '4		DE01 " :
	DMRS precode		-	REG bundle size
DDV Carfferen	REG bundle si	<u> </u>	-	6 DDV 11
DRX Configura			-	DRX.11
Gap pattern ID				N.A.
	Layer 3 filtering			Enabled
T310 timer		ms	4000	
T311 timer		ms	1000	
N310			1	
N311		1	1	
CSI-RS for CSI reporting Config 1		1	CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2	
	CSI-RS for tracking Config 1			TRS.2.1 TDD
T1			S	0.2
T2			S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88

D1		S	3.84
Note 1: All configurations are assigned to the UE prior to the start of time period T1.			
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

Para	Unit			Test 1			
			T1	T2	T3	T4	T5
AoA setup			Setup 1	defined	in A.3.1	15	
EPRE ratio of PDCCH	DMRS to SSS	dB			4		
EPRE ratio of PDCCH	to PDCCH DMRS	dB			0		
EPRE ratio of PBCH D	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB			0		
EPRE ratio of PDSCH	dB						
EPRE ratio of OCNG [DMRS to SSS	dB					
EPRE ratio of OCNG t	o OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1	dB	2	-6	-15	-4.5	2
ssb-Index 1 SNR	Config 1		2	-15	-15	-15	-15
SNR on other	Config 1	dB			2		
channels and signals							
N Config 1		dBm/1		_	104.7dE	2m	
N_{oc}	5KHz			104.7 UL	2111		
Propagation condition			TDL	A 30ns	75Hz		
	esources in		•				
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							

- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.7.5.1.4.1-4: Void Table A.7.5.1.4.1-5: Void

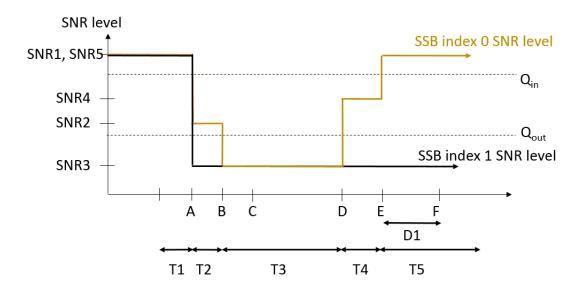


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [10] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP	Config 1		ULBWP.0.1
configuration UL dedicated BWP	Config 1		ULBWP.1.1
configuration CORESET	Config 1		CCR.3.1 TDD
Reference Channel	-		CCR.3.2 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
TRS configuration			Resource #4 in TRS.2.2 TDD TRS.2.1 TDD
TKS configuration			TRS.2.1 TDD
TCI configuration for P	DDCCH#1/PDSCH		TCI.State.2
TCI configuration for P			TCI.State.3
OCNG parameters	DOO! 1#2		OP.1
CP length			Normal
	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			*[<i>gp0</i>]
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
T1		S	0.2
T2		S	0.35
T3		S	0.35
D1		S	0.31
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

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				
			T1	T2	T3	
PDCCH_beta		dB	4			
PDCCH_DMRS	S_beta	dB	4			
PBCH_beta		dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_beta		dB				
OCNG_beta		dB				
SNR on RLM-RS1	Config 1	dB	2	-6	[-15]	
SNR on RLM-RS2	Config 1	dB	2	-14	[-15]	
SNR on other channels and signals	Config 1	dB	2			
N_{oc}	Config 1	dBm/15KHz	ТВ			
Propagation condition			[TDL-C 300ns 100Hz]			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field	Test 1			
Field		Value			
	gapOffset	[0]			
Note 1:	RLM RS is partially overlapped with				
	measurement gap				

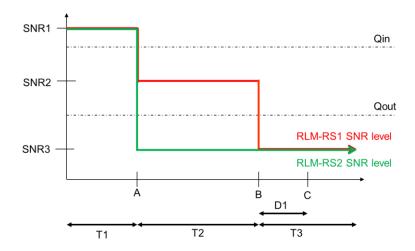


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.5.2 Test Requirements

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

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [10] ms. In the test, DRX configuration is not enabled.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description	
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth	

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration	_		
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
CORESET	Config 1		CCR.3.1 TDD
Reference Channel			CCR.3.2 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for P			TCI.State.2
TCI configuration for P	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
	DCI format		1.0
	DCI format Number of Control OFDM		1-0
Out of owns			2
Out of sync transmission	symbols	005	
parameters	Aggregation level Ratio of hypothetical PDCCH RE	CCE dB	8 4
parameters		uБ	4
	energy to average CSI-RS RE		
	energy Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS	uБ	4
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In avec transmission			•
In sync transmission parameters	DCI format Number of Control OFDM		1-0
parameters			2
	symbols Aggregation level	CCE	1
	Ratio of hypothetical PDCCH RE		0
		dB	0
	energy to average CSI-RS RE		
	energy Ratio of hypothetical PDCCH	٩D	0
		dB	U
	DMRS energy to average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX	INLO DUTICIE SIZE		OFF
			N.A.
Gap pattern ID			
Layer 3 filtering		ma	Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1

N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1			
			T1	T2	T3	T4	T5	
PDCCH_beta	a	dB	4					
PDCCH_DM	RS_beta	dB	4					
PBCH_beta		dB						
PSS_beta		dB	1					
SSS_beta		dB	0					
PDSCH_beta	a	dB]					
OCNG_beta		dB	1					
SNR on	Config 1	dB	2	-6	[-15]	[-4.5]	2	
RLM-RS1								
SNR on	Config 1	dB	2	-14	[-15]	[-15]	-14	
RLM-RS1								
SNR on	Config 1	dB	2					
RLM-RS1								
N_{oc}	Config 1	dBm/15KHz			TBD			
Propagation	n condition [TDL-C 300ns 100Hz]							

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

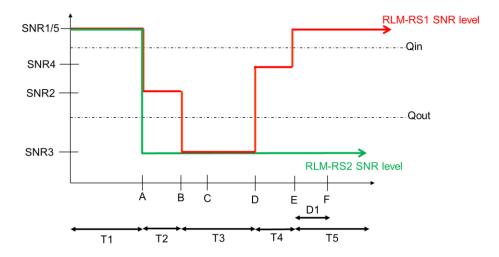


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [10] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration	-		
UL initial BWP	Config 1		ULBWP.0.1
configuration	-		
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
CORESET	Config 1		CCR.3.1 TDD
Reference Channel	-		CCR.3.2 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			1
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
	John J.		Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
l 110 comigaration			TRS.2.2 TDD
TCI configuration for P	DCCH#1/PDSCH		TCI.State.2
TCI configuration for P			TCI.State.3
OCNG parameters	DOOI I#2		OP.1
CP length			Normal
	Antenna Configuration		2x2 Low
	<u> </u>		
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310		-	1
N311			1
CSI-RS for CSI Config 1			CSI-RS.3.1 TDD
reporting			
T1	<u> </u>	S	0.2
T2		S	1.28
T3			1.28
D1		S	1.24
	PDCCH is not transmitted after T1 sta	S	1.24
TNOTE 1. UE-Specific	FDCCH IS NOT ITANSMITTED SITE! 11 Sta	มเจ.	

Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1			
			T1	T2	T3	
PDCCH_beta		dB	4			
PDCCH_DMRS	S_beta	dB	4			
PBCH_beta		dB				
PSS_beta		dB				
SSS_beta		dB		0		
PDSCH_beta		dB				
OCNG_beta		dB				
SNR on RLM-RS1	Config 1	dB	2	-6	[-15]	
SNR on RLM-RS2	Config 1	dB	2	-14	[-15]	
SNR on other channels and signals	Config 1	dB	2			
N_{oc}	Config 1	dBm/15KHz	-104.7			
Propagation condition			[TDL-C 300ns 100Hz]			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

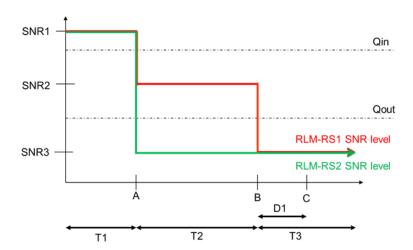


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [10] ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description	
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth	

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP	Config 1		DLBWP.1.1
configuration	Coming 1		DEBWI .I.I
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration	0 " 1		000 0 4 TDD
CORESET	Config 1		CCR.3.1 TDD
Reference Channel	On the A		CCR.3.2 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
	Coming 1		Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for P	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
	CP length		Normal
	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy	ID.	
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
parameters	symbols		_
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE	<u> </u>	
	energy		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			*[<i>gp0</i>]
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1

N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.64
T4		S	0.2
T5		S	1.88
D1		S	1.84
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1				
			T1	T2	T3	T4	T5		
PDCCH_beta	l	dB		4					
PDCCH_DMI	RS_beta	dB		4					
PBCH_beta		dB							
PSS_beta		dB							
SSS_beta		dB			0				
PDSCH_beta	1	dB							
OCNG_beta		dB							
SNR on	Config 1	dB	2	-6	[-15]	[-4.5]	2		
RLM-RS1									
SNR on	Config 1	dB	2	-14	[-15]	[-15]	-14		
RLM-RS1									
SNR on Config 1		dB	2						
RLM-RS1									
N_{oc}	Config 1	dBm/15KHz			-104.7				
¹ ♥ oc									
Propagation condition				[TD	L-C 300ns 10	00Hz]			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Test 1	
Field		Value
	gapOffset	[0]
Note 1: RLM RS is partially overlapped with		
	measurement gap	

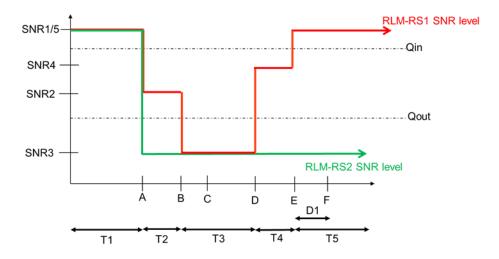


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly, under the condition that the SSB is with different numerology as the PDCCH/PDSCH.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description		
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	
T1	S	1	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Ce	II 1
		configuration	AoA1	AoA2
TDD configuration		1	TDDC	onf.3.1
PDSCH RMC		1	SR.3.1 TDD	Not sent
configuration				
RMSI CORESET		1	CR.3.1 TDD	Not sent
RMC configuration				
Dedicated CORESET		1	CCR.3.2 TDD	Not sent
RMC configuration				
TRS configuration		1	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1	TCI.State.2	N/A
state				
OCNG Pattern		1	OP.1 defined in	Not sent
			A.3.2.1	
Initial DL BWP		1	DLBW	/P.0.1
configuration				
Initial UL BWP		1	ULBW	/P.0.1
configuration				
RLM-RS		1	TRS.2.1 TDD	TRS.2.2 TDD
AoA setup		1		ed in A.3.15.3
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	3	N/A
N_{oc} Note2	dBm/SCS	1	-84.9	Not sent
\hat{E}_s/N_{oc}	dB	1	3	N/A
SS-RSRP Note3	dBm/SCS	1	-81.9	-81.9
lo	dBm/95.04 MHz	1	-51.15	-52.91
Propagation		1	AW	GN
Condition				

A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.7.5.2 Interruption

A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode		

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated		Cell2	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	s	10	

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Cell1	Cell2
Frequency Range		F	R2
Duplex mode		Т	DD
TDD configuration		TDDC	Conf.3.1
BWchannel		100 MHz:	: N _{RB,c} = 66
Initial DL BWP		DLBWI	P.0.2 ^{Note4}
Configuration			
Initial UL BWP		ULBWF	P.0.2 Note6
Configuration			
Downlink dedicated		DLBV	VP.1.1
BWP Configuration			
Uplink dedicated		ULBV	VP.1.1
BWP configuration			
PDSCH Reference		SR.3.	.1 TDD
measurement			
channel			
RMSI CORESET		CR.3	.1 TDD
parameters			
Dedicated		CCR.3	3.1 TDD
CORESET			
parameters			
OCNG Patterns			P.1
SMTC Configuration			TC.1
SSB Configuration			.1 FR2
TCI State			State.0
TRS Configuration			2.1 TDD
Correlation Matrix and Antenna		1x2	! Low
Configuration			
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to S	SSS		
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCC			
DMRS	dB	0	0
EPRE ratio of PDSCH DMRS to			
SSS			
EPRE ratio of PDSCH to PDSCI	1		
EPRE ratio of OCNG DMRS to			
SSS(Note 1)			
EPRE ratio of OCNG to OCNG			
DMRS (Note 1)			
Time offset to Cell1 Note 3	μS	-	3
Propagation Condition		AV	VGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3].

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Para	meter	Unit	Cell 1	Cell 2
Angle of arrival confi	guration		Setup1 according to table A.3.15.1	Setup 1according to table A.3.15.1
$N_{oc}^{}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	- dBm/15kHz	-112	-112
$N_{oc}^{}$ Note1	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	- dBm/SCS	-102.97	-102.97
SS-RSRP ^{Note2}	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	dBm/120KH z ^{Note3}	-85.97	-85.97
\hat{E}_s/N_{oc}		dB	17	17
\hat{E}_s/I_{ot}		dB	17	17
Io ^{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/95.04 MHz ^{Note4}	-56.90	-56.90
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				
Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				

Test Requirements

Note 4:

Note 5:

A.7.5.2.1.2

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on PCell shall not exceed the value defined in Table A.7.5.2.1.2-1 if the PCell is not in the same band as the deactivated SCell or Table A.7.5.2.1.2-2 if the PCell is in the same band as the deactivated SCell.

As observed with 0 dBi gain antenna at the centre of the quiet zone

Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in section A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		4	One NR radio channel is used for this test,
		I	cell 1 and cell2 use the same RF channel.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

ParameterNote 5	Unit	T1	T2	Т3	
Parameter	Unit	Cell 1 Cell 2	Cell 1 Cell 2	Cell 1 Cell 2	

SSB ARFCN		fre	q2	fre	g2	fre	q2
Duplex mode			DD D	TE			DD
TDD configuration		TDDConf.3.1		TDDConf.3.1		TDDConf.3.1	
Downlink initial BWP Configuration		DLBWP.0.1		DLBWP.0.1		DLBWP.0.1	
Downlink dedicated BWP Configuration		DLBV	VP.1.1	DLBW	/P.1.1	DLBWP.1.1	
Uplink initial BWP configuration		ULBV	VP.0.1	ULBW	/P.0.1	ULBW	/P.0.1
Uplink dedicated BWP configuration		ULBV	VP.1.1	ULBW	/P.1.1	ULBW	/P.1.1
TRS configuration		TRS.2	.1 TDD	TRS.2.	1 TDD	TRS.2.	.1 TDD
TCI state		TCI.S	State.0	TCI.S	tate.0	TCI.S	tate.0
BW _{channel}	MHz	100: N	RB,c = 66	100: N _R	$_{B,c} = 66$	100: N _F	RB,c = 66
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Parameters		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
Dedicated 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				SMT	ΓC.1		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS	dB			(1		
EPRE ratio of PDSCH_DMRS to SSS	uБ			,	,		
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
EPRE ratio of OCNG to OCNG DMRS Note							
Propagation conditions				AW			
Note 1. OCNC shall be used such that be	th II				***		

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 Note 6	Unit		Cell 1			Cell 2	
Farameter ****	Unit	T1	T2	Т3	T1	T2	T3

Angle of arrival configuration		Setup 1 according to table A.3.15.1	Setup 1 according to table A.3.15.1
$N_{oc}^{ m Note1}$	dBm/15kHz ^N	-112	-112
N_{oc}^{Note1}	dBm/SCS ^{Note}	-102.97	-102.97
\hat{E}_s/N_{oc}	dB	14	14
SS-RSRP ^{Note2}	dBm/SCS Note4	-88.97	-88.97
\hat{E}_{s}/I_{ot}	dB	14	14
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-88.80	-88.80

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: All parameters apply for configuration 1 and 2

A.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 [$T_{SMTC_SCell} + 5ms$] as defined in section 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in 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.7.5.3.2.1-3.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE is onl	y 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

Davassa	eter ^{Note 5}	I I mit	Т	1	Т	2	Т	3
Parame	eternois	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Freq1	Freq2	Freq1	Freq2	Freq1	Freq2
Duplex mode	Config 1		FDD	TDD	FDD	TDD	FDD	TDD
	Config 2,3				TDD)	1	1
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	.0.1	TDDCo nf.1.1	111.0.1	TDDCo nf.1.1	111.0.1
Downlink initial BWP Configuration	Config 1,2,3				DLBWP			
Downlink dedicated BWP Configuration	Config 1,2,3		DLBWP.1	DLBWP. 1.1	DLBW P.1.1	DLBW P.1.1	DLBW P.1.1	DLBW P.1.1
Uplink initial BWP configuration	Config 1,2,3		ULBWP.0 .1	ULBWP. 0.1	ULBW P.0.1	ULBW P.0.1	ULBW P.0.1	ULBW P.0.1
Uplink dedicated BWP configuration	Config 1,2,3		ULBWP.1	ULBWP. 1.1	ULBW P.1.1	ULBW P.1.1	ULBW P.1.1	ULBW P.1.1
TRS configuration	Config 1,2,3		N/A	TRS.2.1 TDD	N/A	TRS.2. 1 TDD	N/A	TRS.2. 1 TDD
TCI state	Config 1,2,3		TCI.State.	TCI.Stat e.0	TCI.Sta te.0	TCI.Sta te.0	TCI.Sta te.0	TCI.Sta te.0
BW _{channel}		MHz	10: N _{RB,c}		10:		10:	
	Config 1,2		= 52	100: N _{RB,c} =	N _{RB,c} = 52	100: N _{RB,c} =	N _{RB,c} = 52	100: N _{RB,c} =
	Config 3		40: N _{RB,c} = 106	66	40: N _{RB,c} = 106	66	40: N _{RB,c} = 106	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	-
onarino.	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	
Dedicated	Config 1		CCR.1.1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
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	Г	1	007 :		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		4						
EPRE ratio of PBCH_ EPRE ratio of PBCH								
		-						
	EPRE ratio of PDCCH_DMRS to SSS		0					
EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS		}						
EPRE ratio of PDSCI	to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}								

EPRE ra	tio of OCNG to OCNG DMRS Note					
Propagat	ion 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 n	pise sources not 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:	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 a receiver antenna port.	are specified assuming independent interference and noise at each				
Note 5:	All parameters apply for configurat	on 1 and 2				

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

D	- ramatar	l lmi4	Cell 2				Cell 1	
Parameter		Unit	T1	T2	T3	T1	T2	T3
Angle of arrival configuration			According to section A.3.15.1		NA			
$N_{oc}^{}$ Note1		dBm/15kHz	-112		-104			
N Note1	Config 1,2	dBm/SCS	-102.97			-104		
N_{oc} Note1	Config 3,	ubili/SCS	-102.97			-101		
	Config 1,2	dBm/SCS	-85.97 17		-87			
33-K3KP****	Config 3	Note3			-84			
\hat{E}_s/N_{oc}	Config 1,2,3	dB			17			
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	17			17		
Io ^{Note2}	Config 1,2	dBm/ChBW ^N	dBm/ChBW ^N			-58.96		
IO ^{NOLE2}	Config 3	ote4,Note6	-56.90			-52.98		

- 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: ChBW is 94.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

A.7.5.3.2.2 Test Requirements

The test requirements defined in section A.7.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value [TBD] as defined in section 8.3.

A.7.5.4 Viod

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 2.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Con	nfiguration	Description		
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth		
Note:	The UE is only required to pass in one of the supported test configurations in FR2			

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paran	Parameter		Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Nun	nber		1	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP	Config 1, 2		DLBWP.1.1	
configuration				
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET Reference Channel	Config 1, 2		CR. 3.1 TDD	

SSB		Config 1, 2		SSB.1 FR2	
Configuration					
SMTC		Config 1, 2		SMTC.3	
Configu	Configuration				
	H/PDCC	Config 1, 2		120 KHz	
H subc	arrier				
spacing					
PRACE	1	Config 1, 2		Table A.3.8.3.4	
Configu	uration	-			
SSB in	dex assigr	ned as BFD RS		0	
(q ₀)	_				
(1-7					
SSB in	dex assigr	ned as CBD		1	
RS (q ₁)					
. (91)	'				
TCI		Config 1, 2		TBD	
Configu	ıration	- · · · · · · · · · · · · · · · · · · ·			
Comig	aration.				
OCNG	paramete	rs		OP.1	
CP len				Normal	
	Correlation Matrix and Antenna			2x2 Low	
				ZXZ LOW	
Conligi	Configuration DCI format			1.0	
				1-0	
_		of Control		2	
Beam	OFDM s				
failur		ation level	CCE	8	
е		hypothetical	dB	0	
detec		RE energy to			
tion	average	CSI-RS RE			
trans	energy				
missi		hypothetical	dB	0	
on	PDCCH	DMRS energy	ab	Ŭ	
para		ge CSI-RS RE			
meter		ge Col-No NE			
s	energy			5-6: "	
	DMRS p			REG bundle size	
	granular	rity			
	REG bui	ndle size		6	
DRX				OFF	
Gap pa	ttern ID			gp0	
		SyncThreshold		absent	When the field is
		-			absent, the UE
					applies the value
1					0. (Table 8.1.1-1).
rern-Th	resholdSS	SB	dBm	TBD	Threshold used
131P-111	i conoluoc	<i>.</i>	QDIII	100	for Q _{out_LR_SSB}
noword	ControlOffs	20100		db0	
powerc	JUNIOUTS	5E133		นอบ	Used for deriving
					rsrp-
					ThresholdCSI-RS
beamF	aılurelnsta	anceMaxCount		n1	see clause 5.17
					of TS 38.321 [7]
beamF	ailureDete	ectionTimer		pbfd4	see clause 5.17
					of TS 38.321 [7]

CSI-RS configuration for CSI reporting	Config 1, 2		[CSI-RS.3.1 TDD]			
TCI states			[TCI.State.0]			
CSI-RS for tracking	Config 1, 2		[TRS.2.1 TDD]			
SSB index assigned a RS	s RLM		0, 1			
T310 Timer	r	ms	1000			
N310			2			
T1		S	1	During this time the the UE shall be fully synchronized to cell 1		
T2		S	2.61			
T3		S	1.64			
T4		S	0			
T5		S	1.01			
D1		S	0.97			
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.						

Editor's note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.

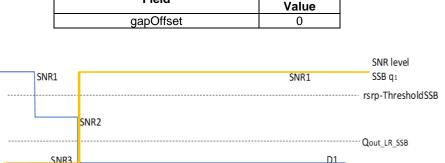
Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	Unit	Test 1						
		T1	T2	Т3	T4	T5		
EPRE ratio of PDCCH DN	IRS to SSS	dB						
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DMF	RS to SSS	dB						
EPRE ratio of PBCH to P	3CH DMRS	dB						
EPRE ratio of PSS to SSS	3	dB	0					
EPRE ratio of PDSCH DN	dB							
EPRE ratio of PDSCH to	EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DM	RS to SSS	dB						
EPRE ratio of OCNG to C	CNG DMRS	dB						
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12	
	Config 2] ub	5	-3	-12	-12	-12	
CND CCD of not a	Config 1	٩D	-12	-12	5	5	5	
SNR_SSB of set q ₁	Config 2	dB	-12	-12	5	5	5	
0		dBm/12		•	TBD	•		
N_{oc}	Config 2	0 KHz		•	TBD	•	·	

Propagat	Propagation condition		TDL-A 30ns 75Hz				
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total						
	transmitted power spectral density						
Note 2:			ssigned to the UE prior to the start of time period T1.				
Note 3:	NZP CSI-RS resource set configur	ation for C	SI reporting are assigned to the UE prior to the start				
	of time period T1.						
Note 4:	Measurement gap configuration is assigned to the UE prior to the start of time period T1.						
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period						
	T1.						
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.						
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.						
Note 8:	The SNR in time periods T1, T2, T3	3, T4 and	T5 is denoted as SNR1, SNR2 and SNR3				
	respectively in figure A.7.5.5.1.1-1.						
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For						
	testing of a UE which supports 4RX	X on all ba	nds, the SNR during T3 is modified as specified in				
	section [A.3.6].		•				

Table A.7.5.5.1.1-4: Measurement gap configuration for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Field



Test 1

D

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

T3

A.7.5.5.1.2 Test Requirements

SNR level

SSB qo

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

B C

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [960+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink SNR of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

Con	nfiguration	Description		
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
DL initial BWP configuration	Config 1, 2		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1	
TDD Configuration	Config 1, 2		TDDConf.3.1	
CORESET Reference Channel	Config 1, 2		CR. 3.1 TDD	
SSB Configuration	Config 1, 2		SSB.1 FR2	
SMTC Configuration	Config 1, 2		SMTC.3	
PDSCH/PDCCH subcarrier spacing	Config 1, 2		120 KHz	

PRACH Config	guration Cor	nfig 1, 2		Table A.3.8.3.4	
SSB index assigned as BFD RS (q ₀)			0		
SSB index assigned as CBD RS (q ₁)					
SSB index ass	signed as CBD	RS (q ₁)		1	
TCI Configura	tion Cor	nfig 1, 2		TBD	
OCNG parame	eters			OP.1	
CP length				Normal	
	atrix and Antenr	na		2x2 Low	
Configuration Beam failure	DCI format			1-0	
detection	Number of Co	ntrol		2	
transmission	OFDM symbo			<u>-</u>	
parameters	Aggregation I	evel	CCE	8	
	Ratio of hypo		dB	0	
	PDCCH RE e				
	average CSI-	RS RE			
	energy		I.D.		
	Ratio of hypo	thetical	dB	0	
	PDCCH DMR to average CS	SI_DS DE			
	energy	SI-ING INL			
	DMRS precod	der		REG bundle size	
	granularity				
	REG bundle s	size		6	
DRX				DRX.3	A.3.3.3
Gap pattern ID				N.A.	
rlmInSyncOut	OfSyncThresho	ld		absent	When the field
					is absent, the
				UE applies the value 0. (Table	
					8.1.1-1).
rsrp-Threshold	ISSB		dBm	TBD	Threshold used
					for Q _{out_LR_SSB}
powerControl	OffsetSS			db0	Used for
					deriving rsrp-
				ThresholdCSI-	
beamFailureInstanceMaxCount				-4	RS see clause 5.17
beamrailurein	istancewaxcou	m		n1	of TS 38.321 [7]
beamFailureD	etectionTimer			pbfd4	see clause 5.17
				•	of TS 38.321 [7]
CSI-RS config	uration for	Config 1,		[CSI-RS.3.1 TDD]	A.3.14.2
CSI reporting 2					
TCI states		10 " :		[TCI.State.0]	
CSI-RS for tra	CSI-RS for tracking Config 1,			[TRS.2.1 TDD]	
SSB index assigned as RLM RS			0, 1		
T310 Timer			ms	1000	
N310				2	
T1	T1		S	1	During this time
					the the UE shall
					be fully
					synchronized to cell 1
T2			S	3.37	COII 1
T3			S	2.8	
T4			S	0	
T5			S	0.61	

D1	S	0.57	
Note 1: All configurations are assigned UE-specific PDCCH is not trans		E prior to the start of time period T1. fter T1 starts.	

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter			Unit	Test 1				
				T1	T2	Т3	T4	T5
EPRE ratio of PDCCH	dB	dB						
EPRE ratio of PDCCH	dB							
EPRE ratio of PBCH [OMRS	S to SSS	dB					
EPRE ratio of PBCH t	o PB0	CH DMRS	dB					
EPRE ratio of PSS to	SSS		dB			0		
EPRE ratio of PDSCH	DMF	RS to SSS	dB					
EPRE ratio of PDSCH	to PI	DSCH DMRS	dB					
EPRE ratio of OCNG	DMR	S to SSS	dB					
EPRE ratio of OCNG	dB							
SNR_SSB of set q ₀		Config 1	dB	5	-3	-12	-12	-12
	С		ub ub	5	-3	-12	-12	-12
SNR_SSB of set q ₁		Config 1	dB	-12	-12	-12	-3	10
		Config 2	ub ub	-12	-12	-12	-3	10
SNR_CSI-RS of RLM-RS		Config 1	dB	5	5	5	5	5
	Config 2			5	5	5	5	5
N_{oc}		Config 1	dBm/12	TBD				
		Config 2	0 KHz	TBD				
Propagation condition				TDL-A 30ns 75Hz in Cell 1 are fully allocated and a constant total				
							constant to	otal
		er spectral density						
		rces for CSI repo						
Note 3: NZP CSI-R of time peri		ource set configu	ration for C	Si reporting	g are assigi	ied to the t	JE prior to	ine start
		ip configuration is	assigned t	to the LIE n	rior to the s	tart of time	neriod T1	
		ayer 3 filtering rela						neriod
T1.	ana i	ayer o miening rem	ateu param	ictors are e	oringarea p		start or time	period
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.								
		are specified for						
•		hich supports 4R	X on all ba	nds, the SN	NR during T	3 is modifie	ed as speci	fied in
section [A.3	section [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
rieid	Value
gapOffset	0

Table A.7.5.5.2.1-5: Void

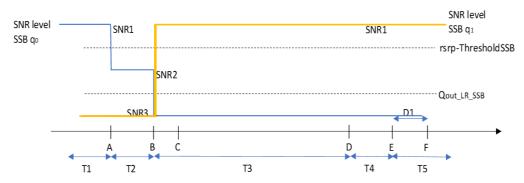


Figure A.7.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = [560+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements without gaps.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Paramet	er	Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET	Config 1		CR.3.1 TDD	A.3.1.2
Reference Channel				
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120KHz	
subcarrier spacing				
csi-RS-Index assigned			[0]	
failure detection RS in	set q ₀		TDO 0.4 TDD	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	A 2 2 4
OCNG parameters			OP.1	A.3.2.1
CP length Correlation Matrix and	Antonno		Normal 2x2 Low	
Configuration Matrix and Configuration				
	DCI format		1-0	
D (''	Number of		2	
Beam failure	Control			
detection transmission	OFDM			
parameters	symbols Aggregation	CCE	8	
parameters	level	CCE	0	
	Ratio of	dB	0	
	hypothetical	42		
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS energy			
	to average			
	CSI-RS RE			
	energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned as candidate			1	
beam detection RS in set q ₁ rlmInSyncOutOfSyncThreshold			absent	When the field is
niminayncouloiaynci nresnoid			auseni	absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
				for Q _{in_LR_SSB}
powerControlOffsetSS			NA	Used for deriving
				rsrp-
				ThresholdCSI-RS

beamFailureInstanceMaxCount			n1	see clause 5.17 of TS 38.321 [7]		
beamFailureDetection ⁻	Timer		pbfd4	see clause 5.17 of TS 38.321 [7]		
CSI-RS configuration for q ₀ and q ₁	Config 1		CSI-RS.3.2 TDD	A.3.14.2		
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2		
csi-RS-Index assigned	as RLM RS		0, 1	A.3.14.2		
T310 Timer		ms	1000			
N310			2			
T1		S	1	During this time the the UE shall be fully synchronized to cell 1		
T2		S	1.17			
T3		S	0.9			
T4		S	0			
T5		S	0.31			
D1		S	0.27			
Note 1: UE-specific	= :					

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

Paramete	r	Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DM	IRS to SSS	dB					
EPRE ratio of PDCCH to I	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	CH DMRS	dB					
EPRE ratio of PSS to SSS	}	dB			0		
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to F	PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5

N_{oc}		Config 1	dBm/15 KHz	TBD			
Propagation condition				TDL-A 30ns 75Hz			
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated an transmitted power spectral density is achieved for all OFDM symbols.							
Note 2:				signed to the UE prior to the start of time period T1.			
Note 3:	Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the st of time period T1.						
Note 4:	Measurement ga	ap configuration is	assigned t	to the UE prior to the start of time period T1.			
Note 5:	lote 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.			eters are configured prior to the start of time period			
Note 6:				an the device under test as part of OCNG.			
Note 7:	SNR levels corre	espond to the sign	al to noise	ratio over the SSS REs.			
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.						
Note 9:				E which supports 2RX on at least one band. For nds, the SNR during T3 is modified as specified in			

Table A.7.5.5.3.1-4: Void Table A.7.5.5.3.1-5: Void

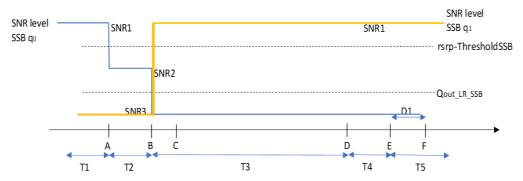


Figure A.7.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink SNR of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of [2] ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description					
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					

Table A.4.5.1.1.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Paramete	r	Unit	Value Test 1	Comment
Active DCell			Call 4	
Active PCell RF Channel Number			Cell 1	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing	3			
csi-RS-Index assigned as	beam failure		[0]	
detection RS in set q ₀			1-1	
TRS configuration			TRS.2.1 TDD	
TCI configuration			CSI-RS.Config.0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and An	tenna		2x2 Low	
Configuration				
	DCI format		1-0	
	Number of		2	
Beam failure detection	Control			
transmission parameters	OFDM			
	symbols			
	Aggregation level	CCE	8	
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to			
	average CSI-			
	RS RĚ			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS energy			
	to average			
	CSI-RS RE			
	energy			
	DMRS		REG bundle size	
	precoder			
	granularity			ļ
	REG bundle		6	
	size			
DRX			DRX.3	A.3.3.3
Gap pattern ID			N.A.	
csi-RS-Index assigned as			1	
beam detection RS in set	<u>q</u> 1			140
rlmInSyncOutOfSyncThre	shold		absent	When the field is
				absent, the UE
				applies the value
TI 1 1 1000		I.C.	TOO	0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm	TBD	Threshold used
0 1 10" 100			" 0	for Q _{in_LR_SSB}
powerControlOffsetSS			db0	Used for deriving
				rsrp-
				ThresholdCSI-RS

beamFailureInstanceMax(n1	see clause 5.17 of TS 38.321 [7]	
beamFailureDetectionTimer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q ₀ and q ₁	Config 1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2
csi-RS-Index assigned as RLM RS	Config 1		CSI-RS.3.2 TDD	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	5.43	
T3		S	5.16	
T4		S	0	
T5		S	0.31	
D1	•	S	0.27	
Note 1: UE-specific PD	CCH is not transr	mitted after 7	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

Paramete	er	Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DM	IRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB	1				
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB			0		
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
SNR CSI-RS of set q ₁	Config 1	dB	-12	-12	5	5	5

N_{oc}		Config 1	dBm/12	TBD
1 voc		0 KHz		
Propagati	on condition			TDL-A 30ns 75Hz
Note 1:	OCNG shall be u	used such that the	resources	in Cell 1 are fully allocated and a constant total
				ed for all OFDM symbols.
Note 2:	The uplink resou	rces for CSI repor	rting are as	ssigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS res	ource set configu	ration for C	SI reporting are assigned to the UE prior to the start
	of time period T1	l .		
Note 4:	Measurement ga	ap configuration is	assigned t	to the UE prior to the start of time period T1.
Note 5:	The timers and la	ayer 3 filtering rela	ated param	neters are configured prior to the start of time period
	T1.			
Note 6:				an the device under test as part of OCNG.
Note 7:	SNR levels corre	espond to the sign	al to noise	ratio over the SSS REs.
Note 8:				T5 is denoted as SNR1, SNR2 and SNR3
	respectively in figure A.7.5.5.4.1-1.			
Note 9:	3			
	•	vhich supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in
	section [A.3.6].			

Table A.7.5.5.4.1-4: Void

Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void



Figure A.7.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = [260+10] ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q₀ in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink SNR of the SSB in set q₁ of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The U	E is only required to be tested in one of the supported test configurations

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Pa	rameter	Unit	Value	Comment
		O	Test 1	
Active PCell			Cell 1	
RF Channel Number	Confin 4.0		1 TDD	
Duplex mode	Config 1,2		TDDConf.3.1	
TDD Configuration DL initial BWP	Config 1,2 Config 1, 2		DLBWP.0.1	
configuration	Comig 1, 2		DLBWF.U.1	
DL dedicated BWP	Config 1, 2		DLBWP.1.1	
configuration	Joining 1, 2		DEBWI IIII	
UL initial BWP	Config 1, 2		ULBWP.0.1	
configuration	3 ,			
UL dedicated BWP	Config 1, 2		ULBWP.1.1	
configuration				
CORESET Reference	Config 1,2		CR. 3.1 TDD	
Channel				
SSB Configuration	Config 1,2		SSB.1 FR2	
SMTC Configuration	Config 1,2		SMTC.1	
PDSCH/PDCCH	Config 1,2		120 KHz	
subcarrier spacing			2	
SSB index assigned as E			0	
SSB index assigned as 0 TRS configuration	ово ко (q ₁)		TRS.2.1 TDD	
TCI configuration			TCI.State.0	
OCNG parameters			OP.1	
AoA Setup			Setup 1	A.3.15.1
CP length			Normal	A.S. 15.1
Correlation Matrix and A	ntenna Configuration		2x2 Low	
Correlation Watrix and A	•			
	DCI format		1-0	
	Number of Control OFDM		2	
Beam failure detection	symbols			
transmission	Aggregation level	CCE	8	
parameters	Ratio of hypothetical	dB	0	
	PDCCH RE energy to average CSI-RS RE			
	energy			
	Ratio of hypothetical	dB	0	
	PDCCH DMRS energy to	u D		
	average CSI-RS RE			
	energy			
	DMRS precoder granularity		REG bundle size	
	· · · · · · · · · · · · · · · · · · ·		0	
DDV	REG bundle size		6	DRX is not in use
DRX Gap pattern ID			OFF N.A.	No measurement gap
Oap pattern ID			IN.A.	pattern is configured
ssb-Index			2	Number of SSB
1			_	indexes used for beam
				failure detection
rlmInSyncOutOfSyncThreshold			absent	When the field is
				absent, the UE applies
				the 10%
rsrp-ThresholdSSB		dBm	[-94.5]	Threshold used for
0 (10" (00				Q _{in_LR}
powerControlOffsetSS			db0	Used for deriving rsrp-
beamFailureInstanceMa	vCount		n2	ThresholdCSI-RS see TS 38.321 [7],
Deamrailureinstanceivia:	xCOurt		IIZ	see 15 38.321 [7], section 5.17
		l	1	3660011 3.17

beamFailureDetectionTimer			pbfd4	see TS 38.321 [7],
0010 " " "	10 5 40		001 00 0 0 TDD	section 5.17
CSI Configuration for	Config 1,2		CSI-RS.3.3 TDD	A.3.14.2
reporting				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the
				UÉ shall be fully
				synchronized to cell 1
T2		S	2.6	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1			0.97	
Note 1: All configurat	ions are assigned to the UE pr	ior to the s	tart of time period T1.	•
Note 2: UF-specific F	PDCCH is not transmitted after	T1 starts		

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
		T1	T2	Т3	T4	T5	
EPRE ratio of PDCCH DN	/IRS to SSS	dB					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB	0				
EPRE ratio of PDSCH DN	/IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2	uБ	5	-3	-12	-12	-12
SNR SSB of set q ₁	Config 1	dB	-12	-12	5	5	5
SINK_SSB OF Set q1	Config 2	uБ	-12	-12	5	5	5
N_{oc}	Config 1	dBm/15	-104.7				
¹ v oc	Config 2	KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in section [A.3.6].

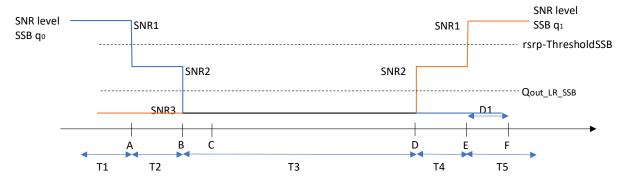


Figure A.7.5.5.5.1-1: SNR variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.7.5.6 Active BWP switch

A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

UE is configured with a bwp-InactivityTimer timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS. 100 MHz bandwidth, TDD -TDD duplex mode		

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	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	d	O	
Cell2 timing offset to cell1	0	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 A7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell2	
Frequency Range		FR2 FR2		
Duplex mode		TDD		
TDD configuration		TDD	Conf.3.1	
BW _{channel}		100 MH	z: N _{RB,c} = 66	
Active BWP ID		1, 2	3	
Downlink initial BWP Configuration			3WP.0.2	
Uplink initial BWP Configuration			3WP.0.2	
Downlink active BWP-1 Configuration		DLBWP.1.3	-	
Downlink active BWP-2 Configuration		DLBWP.1.3	-	
Uplink active BWP-1 Configuration		ULBWP.1.3	-	
Uplink active BWP-2 Configuration		ULBWP.1.3	-	
PDSCH Reference measurement channel		SR.	3.1 TDD	
TRS configuration		TRS	.2.1 TDD	
TCI state		TCI.State.0		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters				
		CCR	.3.1 TDD	
OCNG Patterns		(OP.1	
SSB Configuration		SS	B.1 FR2	
SMTC Configuration		S	MTC.1	
Correlation Matrix and Antenna		1>	2 Low	
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS		_	_	
EPRE ratio of PDSCH DMRS to SSS	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)				
Propagation Condition		AWGN	AWGN	
Note 1: OCNG shall be used such that bot	h calls ara ful			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.6.1.1.1-4: OTA related test parameters for BWP switching test caseParameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1	Setup 1 defined in clause A.3.15.1
$N_{oc}^{}$ Note1	dBm/15kHz	-112	-112
$N_{oc}^{}$ Note1	dBm/SCS	-103	-103
SS-RSRP ^{Note2}	dBm/SCS Note3	-85	-85
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	18	18
Io ^{Note4}	dBm/95.04 MHz ^{Note4}	-56	-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.

A.7.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.

UE is configured with a bwp-InactivityTimer timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted i. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 no later than the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on PSCell's BWP-1 no later than the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The starting time of SCell (Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to SCell is carried out in the correct time span by monitoring ACK/NACK sent in SCell during BWP switch of PCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description			
1	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3	PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	ū	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	מ	0	
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 A6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Para	meter	Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
•	Config 2,3	1	TDD	TDD
TDD configuration	nfiguration Config 1		Not Applicable	
-	Config 2	1	TDDConf.1.1	TDDConf.3.1
	Config 3	1	TDDConf.2.1	
BW _{channel}	Config 1,2	MHz	10 MHz: N _{RB,c} = 52	100 MHz: N _{RB,c} = 66
	Config 3	1	40 MHz: N _{RB,c} = 106	100 WITZ. NRB,c = 66
Active BWP ID	<u> </u>		1, 2	3
Downlink initial BWP	Configuration			VP.0.2
Uplink initial BWP Co				VP.0.2
Downlink active BWF	P-1 Configuration		DLBWP.1.3	-
Downlink active BWI	P-2 Configuration		DLBWP.1.3	-
Uplink active BWP-1	Configuration		DLBWP.1.3	-
Uplink active BWP-2	Configuration		DLBWP.1.3	-
PDSCH Reference	Config 1		SR.1.1 FDD	SR.3.1 TDD
measurement	Config 2	1	SR.1.1 TDD	
channel	Config 3	1	SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	
parameters	Config 2		CR.1.1 TDD	CR.3.1 TDD
	Config 3		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				P.1
SSB Configuration	Config 1,2]	SSB.1 FR1	SSB.1 FR2
	Config 3		SSB.2 FR1	
TRS configuration	Config 1,2,3		-	TRS.2.1 TDD
TCI state	Config 1,2,3		TCI.State.0	TCI.State.0
SMTC Configuration	1.4.			TC.1
Correlation Matrix an	d Antenna		1X2	Low
Configuration EPRE ratio of PSS to				
EPRE ratio of PBCH		-		
		-		
	EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS		1		
EPRE ratio of PDSCH DMRS to SSS		dB	0	0
EPRE ratio of PDSCH to PDSCH		- "	3	
EPRE ratio of OCNG DMRS to SSS(Note		1		
1)				
EPRE ratio of OCNG	to OCNG DMRS]		
(Note 1)				
Propagation Conditio	n		AWGN	AWGN
Nete 4: OONO ele	11.1 1 1.0 (1	(l II II.	11 (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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined in clause A.3.15.1	Setup 1 defined in clause A.3.15.1
$N_{oc}^{ m Note1}$	dBm/15kHz	-112	-112
$N_{oc}^{$	dBm/SCS	-103	-103
SS-RSRP ^{Note2}	dBm/SCS Note3	-85	-85
\hat{E}_{s}/I_{ot}	dB	18	18
Io ^{Note4}	dBm/95.04 MHz ^{Note4}	-56	-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the guiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.

A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PSCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot (i+YI), (j+Y2), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one NR cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell 1's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell 1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than at the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell 1.

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after Cell 1's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest at the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the beginning of the DL slot right after slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

	Config	Description				
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	Void.					
Note 2:	e 2: A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in					
	A.7.5.6.1.3.					

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1		
Frequency Range		FR2		
Duplex mode		TDD		
TDD configuration		TDDConf.3.1		
BWchannel		100 MHz: N _{RB,c} = 66		
Active BWP ID		1, 2		
Initial DL BWP Configuration		DLBWP.0.2 Note 2		
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2		
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2		
Initial UL BWP Configuration		ULBWP.0.2 Note 2		
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2		
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2		
PDSCH Reference measurement channel		SR.3.1 TDD		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		OP.1		
SSB Configuration		SSB.1 FR2		
SMTC Configuration		SMTC.1		
TCI State		TCI.State.0		
TRS Configuration		TRS.2.1 TDD		
Correlation Matrix and Antenna		1x2 Low		
Configuration				
EPRE ratio of PSS to SSS	dB	0		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note				
1)				
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total				
transmitted power spectral density is achieved for all OFDM symbols.				
Note 2: For unpaired spectrum, a DL RWP is linked with an LIL RWP, DL RWP 0.2 is				

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.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

Parameter		Unit	Cell 2			
Angle of arrival configuration			Setup 1 defined in			
			clause A.3.15.1			
Noc ^{Note 1}	N _{oc} Note 1					
		kHz	-112			
N _{oc} Note 1		4D/CCC				
	- N	dBm/SCS	-103			
SS-RSR	P Note 2	dBm/120 kHz ^{Note3}	-85			
Ê _s /I _{ot}	Ê _s /I _{ot}		18			
	Ês/Noc Note 5		18			
Io ^{Note2}		dBm/95.04	F.6.			
		MHz Note4	-56			
Note 1:	Interference from other cells and noise sources not specified in the test is					
	assumed to be constant over subcarriers and time and shall be modelled as					
	AWGN of appropriate power for N_{oc} to be fulfilled.					
Note 2:	SS-RSRP and lo levels have beer	SS-RSRP and lo levels have been derived from other parameters for				
	information purposes. They are not settable parameters themselves.					
Note 3:	SS-RSRP minimum requirements are specified assuming independent					
	interference and noise at each receiver antenna port.					
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the					
	quiet zone		-			
Note 5:	Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.					

A.7.5.6.1.3.2 Test Requirements

During T1, the UE shall start to send the ACK for Cell 1 in the DL slot right after slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK for Cell 1 in the DL slot right after slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after slot ($i + T_{BWPswitchDelay} + kI$), ($j + T_{BWPswitchDelay} + kI$), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with bandwidth part configuration BWP-2, sent from the test equipment to the UE, is completely 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 the beginning of the DL slot right after PCell's DL slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$ as defined in clause 8.6.3 and be ready for the reception of uplink grant for the PCell no later than at the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$. The UE shall be continuously scheduled on PCell's BWP-2 starting from the beginning of the DL slot right after slot $(i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC})$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including BWP switch command is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Config Description	
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only 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					
Frequenc	y Range		FR2					
Duplex m	ode		TDD					
TDD conf	iguration		TDDConf.3.1					
BW _{channel}			100 MHz: N _{RB,c} = 66					
Active BV	VP ID		1, 2					
Initial DL	BWP Configuration		DLBWP.0.2					
Active DL	BWP-1 Configuration		DLBWP.1.3					
Active DL	BWP-2 Configuration		DLBWP.1.1					
Initial UL	BWP Configuration		ULBWP.0.2					
Active UL	BWP-1 Configuration		NA					
Active UL	BWP-2 Configuration		ULBWP.1.3					
	Reference measurement channel		SR.3.1 TDD					
RMSI CO	RESET parameters		CR.3.1 TDD					
	CORESET parameters		CCR.3.1 TDD					
OCNG Pa			OP.1					
SSB Conf	figuration		SSB.1 FR2					
SMTC Co	onfiguration		SMTC.1					
TCI State			TCI.State.0					
TRS Conf	figuration		TRS.2.1 TDD					
Antenna (Configuration		1x2					
	on Condition		AWGN					
EPRE ratio	of PSS to SSS	dB	0					
	of PBCH DMRS to SSS							
	of PBCH to PBCH DMRS							
	of PDCCH DMRS to SSS							
	of PDCCH to PDCCH DMRS							
	of PDSCH DMRS to SSS							
	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							
	total transmitted power spectral de	ensity is achiev	red for all OFDM symbols.					
Note 2:	Interference from other cells and n							
	assumed to be constant over subc							
	as AWGN of appropriate power for N₀c to be fulfilled.							
Note 3:	SS-RSRP and lo levels have been							
	information purposes. They are not settable parameters themselves.							
Note 4:	For unpaired spectrum, a DL BWF							
	is linked with ULBWP.0.2; DLBWP							
	DLBWP.1.3 is linked with ULBWP	.1.3 defined in	clause 12 of TS 38.213					
	[3].							

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Parai	meter	Unit	Cell 2	
Angle of arrival config	guration		According to table A.3.15	
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc}^{Note1}	NR_TDD_FR2_F	NR_TDD_FR2_F		
	NR_TDD_FR2_G	dBm/15kHz	-112	
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_B	dDm/CCC	-103	
	NR_TDD_FR2_F dBm/SCS			
	NR_TDD_FR2_G			

	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	-85				
30-NONE	NR_TDD_FR2_G	Note3					
	NR_TDD_FR2_T						
	NR_TDD_FR2_Y						
\hat{E}_{s}/I_{ot}		dB					
	NR_TDD_FR2_A						
	NR_TDD_FR2_B						
IoNote2	NR_TDD_FR2_F	dBm/95.04	-56				
10.10102	NR_TDD_FR2_G	MHz ^{Note4}					
	NR_TDD_FR2_T						
	NR_TDD_FR2_Y						
assumed		carriers and time	ot specified in the test is e and shall be modelled as ed.				
	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
	: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						
Note 4: Equivaler quiet zon	•	antenna with 0 d	dBi gain at the centre of the				

A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell in the beginning of the DL slot right after slot ($i+T_{RRCprocessingDelay}+T_{BWPswitchDelayRRC}$).

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6 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

Cor	nfiguration	Description				
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	ote: The UE is only required to be tested in one of the supported test configurations.					

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and	One TDD carrier frequency is used for the
		1, 2	Cell 2	NR cells.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and		1, 2	3 μs	Synchronous EN-DC
Cell 2		1, 2		
Time offset between Cell 2 and		1, 2	3 μs	Synchronous cells
Cell 3		1, 4		
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	Се	Cell 1		Cell 2	
			T1	T2	T1	T2	

TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1, 2	SR.3.1 TDD	N/A
configuration				
RMSI CORESET		1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration				
Dedicated		1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC				
configuration				
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1, 2	TCI.State.2	N/A
TCI states				
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.1 FR2	SSB.1 FR2
		2	SSB.2 FR2	SSB.2 FR2
Propagation	_	1, 2	AV	VGN
Condition				

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	S	etup 3 defir	ned in A.3.1	5.3
\hat{E}_{s}/I_{ot}	dB	1, 2	TBD	TBD	TBD	TBD
N_{oc} Note 2	dBm/15 KHz	1, 2	TBD			
N_{oc} Note 2	dBm/SCS	1	TBD			
1 oc		2		Т	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	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. They are not settable parameters themselves.

A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.2 SA event triggered reporting test without gap under DRX

A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

	Configuration	Description				
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note	te: The UE is only required to be tested in one of the supported test configurations.					

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 \sim 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1, 2	PCell (Ce	ell 1)		
Neighbour cell		1, 2	Cell 2		Cell to be identified.	
RF Channel Number		1, 2	1: Cell 1	and Cell 2	One TDD carrier frequency is used for the	
		1, 2		NR cells.		
SMTC configuration		1, 2	SMTC.1			
A3-Offset	dB	1, 2	-6			
CP length		1, 2	Normal			
Hysteresis	dB	1, 2	0			
Time To Trigger	S	1, 2	0			
Filter coefficient		1, 2	0		L3 filtering is not used	
DRX		1, 2	DRX.1	DRX.2	DRX related parameters are defined in	
		1, 2			Table A.7.6.1.2.1-5	
Time offset between Cell 1		1, 2	3 μs		Synchronous EN-DC	
and Cell 2		1, 2				
Time offset between Cell 2		1, 2	3 μs		Synchronous cells	
and Cell 3		1, 2				
T1	s	1, 2	5			
T2	s	1, 2	10	52		

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1		Ce	II 2
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3	3.1	TDDC	onf.3.1
Intial BWP		1, 2	DLBWP.0	.1	DLBWP.0.1	
configuration			ULBWP.0	.1	ULBW	/P.0.1
Active DL BWP		1, 2	DLBWP.1	.1	DLBW	/P.1.1
configuration						
Active UL BWP		1, 2	ULBWP.1	.1	ULBW	/P.1.1
configuration						
RLM-RS		1, 2	SSB		SS	SB
PDSCH RMC		1, 2	SR.3.1 TE	DD	N,	/A
configuration						
RMSI CORESET		1, 2	CR.3.1 TE	DD	CR.3.	1 TDD
RMC						
configuration						
Dedicated		1, 2	CCR.3.1 T	DD	CCR.3	.1 TDD
CORESET RMC						
configuration						
TRS configuration		1, 2	TRS.2.1 TI	DD	N,	/A
PDSCH/PDCCH		1, 2	TCI.State	.2	N,	/A
TCI states						
OCNG Patterns		1, 2	OP.1		OF	P.1
SSB		1	SSB.1 FF	2	SSB.	1 FR2
		2	SSB.2 FF	R2	SSB.2	2 FR2
Propagation		1, 2		AW	'GN	
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	Cell 1		Cell 2		
			T1	T2	T1	T2	
AoA setup		1, 2	Se	etup 1 defir	ned in A.3.1	5.1	
\hat{E}_{s}/I_{ot}	dB	1, 2	4 -1.46 -Infinity			-1.46	
N_{oc} Note 2	dBm/15 KHz	1, 2	-98				
Note 2	dBm/SCS	1	-89 -86				
1 oc		2					
SS-RSRP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
Io	dBm/95.04MHz	1	-54.56 -52.21 -54.56			-52.21	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

С	Configuration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	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	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous 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	Cell 1		Cell 2	
			T1	T2	T1	T2

TDD configuration	1, 2	TDDConf.3.1	TDDConf.3.1
Intial BWP	1, 2	DLBWP.0.1	DLBWP.0.1
configuration		ULBWP.0.1	ULBWP.0.1
Active DL BWP	1, 2	DLBWP.1.2	DLBWP.1.1
configuration			
Active UL BWP	1, 2	ULBWP.1.2	ULBWP.1.1
configuration			
RLM-RS	1, 2	CSI-RS	SSB
PDSCH RMC	1, 2	SR.3.1 TDD	N/A
configuration			
RMSI CORESET	1, 2	CR.3.1 TDD	CR.3.1 TDD
RMC			
configuration			
Dedicated	1, 2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			
configuration			
TRS configuration	1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH	1, 2	TCI.State.2	N/A
TCI states			
OCNG Patterns	1, 2	OP.1	OP.1
SSB	1	SSB.1 FR2	SSB.1 FR2
	2	SSB.2 FR2	SSB.2 FR2
Propagation	1, 2	AV	VGN
Condition			

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Ce	Cell 1		II 2
			T1	T2	T1	T2
AoA setup		1, 2	S	etup 3 defir	ned in A.3.1	5.3
\hat{E}_{s}/I_{ot}	dB	1, 2	TBD TBD T		TBD	TBD
N_{oc} Note 2	dBm/15 KHz	1, 2	TBD			
N_{oc} Note 2	dBm/SCS	1	TBD TBD			
1 oc		2				
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. They are not settable parameters themselves.

A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

	Configuration	Description			
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note	Note: The UE is only required to be tested in one of the supported test configurations.				

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Value		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	and Cell 2	One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE ga	aps	
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3.	.2 TDD	
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.2	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous 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	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cel	Cell 1		II 2
			T1	T2	T1	T2
TDD configuration		1, 2	TDDCc	nf.3.1	TDDC	onf.3.1
Intial BWP		1, 2	DLBW	P.0.1	DLBV	VP.0.1
configuration			ULBW	P.0.1	ULBV	VP.0.1
Active DL BWP		1, 2	DLBW	P.1.2	DLBV	VP.1.1
configuration						
Active UL BWP		1, 2	ULBW	P.1.2	ULBV	VP.1.1
configuration						
RLM-RS		1, 2	SCS	-RS	SS	SB
PDSCH RMC		1, 2	SR.3.1	SR.3.1 TDD		/A
configuration						
RMSI CORESET		1, 2	CR.3.1	CR.3.1 TDD		1 TDD
RMC						
configuration						
Dedicated		1, 2	CCR.3.	1 TDD	CCR.3	.1 TDD
CORESET RMC						
configuration						
TRS configuration		1, 2	TRS.2.	1 TDD	N	/A
TCI state		1, 2	CSI-RS.0	Config.0	N	/A
OCNG Patterns		1, 2	OP	OP.1 OP.1		² .1
SSB		1	SSB.1	SSB.1 FR2 SSB.1 FR2		1 FR2
		2	SSB.2	SSB.2 FR2 SS		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 1	Ce	Cell 2	
			T1	T2	T1	T2	
AoA setup		1, 2	S	etup 1 defii	ned in A.3.1	5.1	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	1, 2 4 -1.46 -In		-Infinity	-1.46	
N_{oc} Note 2	dBm/15 KHz	1, 2		-98			
N_{oc} Note 2	dBm/SCS	1		-89 -86			
1 voc		2					
SS-RSRP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
Io	dBm/95.04MHz	1	-54.56	-52.21	-54.56	-52.21	

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.6.1.4.1-5: Void

Table A.7.6.1.4.1-6:Void

A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2 Inter-frequency Measurements

A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void	

Table A.7.6.2.1.1-1: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value		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
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	s	Config 1	5		
T2	S	Config 1	5.2 for PC1; 3.5 for other PC		

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

NR RF Channel Number	Para	Parameter		Test	Се	II 1	С	Cell 1		
NR RF Channel Number			Unit	_						
Duplex mode	NP PF Channe	al Number				<u> </u> 1		2		
TDD configuration		erramber		_			-			
BM/P BW		tion								
BWP BW		шоп	MHz							
BWP Configuration BWP Dedicated DL BWP Dedicated DL BWP Dedicated DL BWP Dedicated DL BWP Dedicated UL BWP De										
Initial UL BWP Dedicated DL BWP Dedicated DL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP Dedicated UL BWP ULBWP.1.1 N/A	BWP			J						
BW/P Dedicated DL	configuration									
Dedicated DL BWP Dedicated UL					ULBV	VP.0.1		N/A		
BWP Dedicated UL BWP Dedic				Config 1	DI BV	/P 1 1		N/A		
BWP					DLDV	v	'	14/7		
SWP]	III BW	/P 1 1		N/Δ		
A.3.2.1.1 (OP.1)	00110				OLDV	VI .I.I		11/73		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				Config 1	O	0.4	,	ND 4		
Measurement channel		•					,			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				Config 1	JN.J.	טטוו		-		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $				Confin 4	CR.3.	1 TDD		-		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				Config 1						
PDSCH/PDCCH subcarrier Spacing TRS configuration Config 1 TRS.2.1 TDD N/A				Config 1	SM	ГС 1	SN	ATC 1		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				J	OW		GIVITO.1			
$ \begin{array}{ c c c c c } \hline TRS configuration & Config 1 & TRS.2.1 TDD & N/A \\ \hline TCI configuration & Config 1 & CSI-RS.Config.0 & N/A \\ \hline EPRE ratio of PSS to SSS & EPRE ratio of PBCH DMRS to SSS & EPRE ratio of PDCCH DMRS to SSS & EPRE ratio of PDCCH DMRS to SSS & EPRE ratio of PDCCH DMRS to SSS & EPRE ratio of PDSCH DMRS & Config 1 & 0 & 0 & 0 \\ \hline EPRE ratio of PDSCH DMRS to SSS & EPRE ratio of OCNG DMRS to SSS & EPRE ratio of OCNG DMRS to SSS & EPRE ratio of OCNG DMRS & Config 1 & -98 &$		H subcarrier	kHz	Config 1	1:	20	120			
$ \begin{array}{ c c c c c }\hline TCl configuration & Config 1 & CSI-RS.Config.0 & N/A \\ \hline EPRE ratio of PSS to SSS & \\ \hline EPRE ratio of PBCH DMRS to SSS & \\ \hline EPRE ratio of PBCH to PBCH DMRS to SSS & \\ \hline EPRE ratio of PDCCH DMRS to SSS & \\ \hline EPRE ratio of PDCCH to PDCCH DMRS to SSS & \\ \hline EPRE ratio of PDSCH DMRS to SSS & \\ \hline EPRE ratio of PDSCH to PDSCH to PDSCH to PDSCH DMRS to SSS(Note 1) & \\ \hline EPRE ratio of OCNG DMRS to SSS(Note 1) & \\ \hline EPRE ratio of OCNG to OCNG DMRS (Note 1) & \\ \hline N_{oc}^{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $		tion		Config 1	TRS 2.1 TDD		N/A			
$ \begin{array}{ c c c c c c }\hline EPRE \ ratio \ of \ PSS \ to \ SSS \\ \hline EPRE \ ratio \ of \ PBCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PBCH \ to \ PBCH \\ DMRS \\ \hline EPRE \ ratio \ of \ PDCCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PDCCH \ to \\ PDCCH \ DMRS \\ \hline EPRE \ ratio \ of \ PDSCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PDSCH \ to \\ PDSCH \\ \hline EPRE \ ratio \ of \ PDSCH \ to \\ PDSCH \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ to \\ OCNG \ DMRS \ (Note \ 1) \\ \hline \hline N_{oc}^{\ \ Note2} \\ \hline \hline N_{oc}^{\ \ \ Note2} \\ \hline \hline SS-RSRP \ ^{Note \ 3} \\ \hline \hline \hat{E}_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_{_$										
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$, and the second						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of l	PBCH DMRS		-						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS									
$ \begin{array}{ c c c c c c }\hline EPRE \ ratio \ of \ PDCCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PDCCH \ to \\ PDCCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PDSCH \ DMRS \\ to \ SSS \\ \hline EPRE \ ratio \ of \ PDSCH \ to \\ PDSCH \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 1) \\ \hline EPRE \ ratio \ of \ OCNG \ DMRS \\ to \ SSS(Note \ 2) \\ \hline Note2 \\ \hline SS-RSRP \ ^{Note2} \\ \hline SS-RSRP \ ^{Note2} \\ \hline E_s/I_{ot} \\ \hline \ dB \ \ Config \ 1 \\ \hline \ dB \ \ Config \ 1 \\ \hline \ 4 \ \ 4 \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$		PBCH to PBCH								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		DDCCH DMDC								
$ \begin{array}{ c c c c c c }\hline EPRE \ ratio \ of \ PDCCH \ to \ PDCCH \ DMRS \\\hline EPRE \ ratio \ of \ PDSCH \ DMRS \\\hline to \ SSS \\\hline EPRE \ ratio \ of \ PDSCH \ to \ PDSCH \\\hline EPRE \ ratio \ of \ PDSCH \ to \ PDSCH \\\hline EPRE \ ratio \ of \ OCNG \ DMRS \\\hline to \ SSS(Note 1) \\\hline EPRE \ ratio \ of \ OCNG \ to \ OCNG \ DMRS \\\hline to \ SSS(Note 1) \\\hline EPRE \ ratio \ of \ OCNG \ to \ OCNG \ DMRS \\\hline (Note 1) \\\hline N_{oc}^{\ Note 2} \\\hline N_{oc}^{\ Note 2} \\\hline SS-RSRP^{\ Note 3} \\\hline E_s/I_{ot} \\\hline \end{array} \begin{array}{ c c c c c c c c c c c c c c c c c c c$		PUCCH DIVIRS								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		PDCCH to		-						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDCCH DMRS	3		Config 1	(0	0			
$\begin{array}{ c c c c c c c c }\hline EPRE \ ratio \ of \ PDSCH \ to \ PDSCH \ \hline EPRE \ ratio \ of \ OCNG \ DMRS \ to \ SSS(Note 1) \ \hline EPRE \ ratio \ of \ OCNG \ to \ OCNG \ DMRS \ (Note 1) \ \hline \\ \hline N_{oc}^{\ \ Note2} \ & dBm/15 \ kHz \ Note5 \ \hline \\ N_{oc}^{\ \ Note2} \ & dBm/S \ CS \ Note4 \ \hline \\ \hline SS-RSRP^{\ \ Note 3} \ & dBm/S \ CS \ Note5 \ \hline \\ \hline \hat{E}_s/I_{ot} \ & dB \ \hline \\ \hline \end{array}$		PDSCH DMRS								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		DDCCH to								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		PD3CH (0								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		OCNG DMRS		-						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$]						
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		(Note 1)	dDm/4 <i>E</i>		00			0.0		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	N_{oc} Note2				-98			-90		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N Note2		dBm/S	Config 1	-89			-89		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	1 voc									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	QQ_DQDD Note 3	<u> </u>		Config 1	-85 -85		-Infinity	_02		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	33-K3KP			Coning i	-85 -85		-milling	-02		
$\hat{E}_{_{s}}/I_{_{ot}}$ dB Config 1 4 4 -Infinity 7										
$\hat{E}_{_{S}}/N_{_{QC}}$ dB Config 1 4 4 -Infinity 7	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			Config 1	4	4	-Infinity	7		
	\hat{E}_s/N_{oc}		dB	Config 1	4	4	-Infinity	7		

Io ^{Note3}		dBm/95	Config 1	-57.55	-57.55	-Infinity	-56.00
		.04				_	
		MHz					
		Note5					
Propagati	ion Condition		Config 1		A۱	WGN	
Note 1:	OCNG shall be used			,	and a consta	nt total trans	mitted power
	spectral density is ac	hieved for	all OFDM symbo	ols.			
Note 2:	Interference from oth	er cells and	d noise sources	not specified	in the test is	s assumed to	be constant
	over subcarriers and	time and s	hall be modelled	l as AWGN o	of appropriate	e power for	N_{oc} to be
	fulfilled.						
Note 3:	SS-RSRP and lo leve	els have be	en derived from	other param	eters for info	ormation purp	ooses. They
	are not settable para	meters the	mselves.				
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at						
	each receiver antenna port.						
Note 5:	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						ne
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone						

A.7.6.2.1.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test			
		on	1			4	
NR RF Channel Number		Config 1		1,	, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR ce	ll 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		39		
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	ıl			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX .1	DRX .2	DRX .1	DRX .2	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3µs				Synchronous cells.
T1	S	Config 1	5				
T2	S	Config 1	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

Parai	Parameter		Test	Ce	II 1	Cell 2	
			configuratio n	T1	T2	T1	T2
NR RF Channe	el Number		Config 1	,	1		2
TDD configurat	tion		Config 1	TDDC	onf.3.1	TDDO	Conf.3.1
Duplex mode	-		Config 1		DD		DD
BW _{channel}		MHz	Config 1	100: N _F	$R_{B,c} = 66$	100: N	$I_{RB,c} = 66$
BWP BW		MHz	Config 1		$R_{B,c} = 66$	100: N	$I_{RB,c} = 66$
BWP configuration	Initial DL BWP			DLBW	/P.0.1		N/A
	Initial UL BWP		Config 1	ULBW			N/A
	Dedicated DL BWP		Comign	DLBW	/P.1.1	1	N/A
	Dedicated UL BWP			ULBW	/P.1.1	1	N/A
OCNG Patterns A.3.2.1.1 (OP.	1)		Config 1	OF		C	P.1
PDSCH Refere measurement	channel		Config 1	SR.3.			-
CORESET Ref Channel			Config 1	CR.3.	1 TDD		-
SMTC configur in A.3.11.1 and	ation defined A.3.11.2		Config 1	SMT	ГС.1	SM	ITC.1
PDSCH/PDCC spacing	H subcarrier	kHz	Config 1	120		120	
TRS configurat	tion		Config 1	TRS.2.1 TDD		N/A	
TCI configuration			Config 1	CSI-RS.Config.0		1	N/A
EPRE ratio of I	PSS to SSS						
EPRE ratio of F to SSS							
EPRE ratio of F	PBCH to PBCH						
EPRE ratio of F to SSS							
EPRE ratio of F PDCCH DMRS	3		Config 1	0		0	
EPRE ratio of F to SSS							
EPRE ratio of F PDSCH							
EPRE ratio of 0 to SSS(Note 1))						
EPRE ratio of 0							
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
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		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 Condition		Config 1 AWGN				
Note 1: OCNG shall be used	cuch that h	oth colle are ful	v allocated a	and a concta	nt total tranc	mittad nawar

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the guiet zone

A.7.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

1200 for UE supporting other power class. In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

In test 1 measurement gap pattern configuration #0 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.3.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config Description							
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode						
Note 1: Void.							

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-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
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3µs		Synchronous cells.
T1	S	Config 1	5		
T2	S	Config 1	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Para	Parameter		Test	Се	ell 1	Cell 2		
			configuratio	T1	T2	T1	T2	
NR RF Channe	el Number		n Config 1		<u> </u> 1		2	
Duplex mode	-		Config 1	ТІ	DD	TDD		
	TDD configuration		Config 1		onf.3.1		Conf.3.1	
BW _{channel}		MHz	Config 1		RB,c = 66	100: N _{RB,c} = 66		
BWP BW		MHz	Config 1		RB,c = 66		$N_{RB,c} = 66$	
BWP configuration	Initial DL BWP				VP.0.1		N/A	
ooga.ao	Initial UL BWP			ULBV	VP.0.1		N/A	
	Dedicated DL BWP		Config 1	DLBV	VP.1.1		N/A	
	Dedicated UL BWP			ULBV	VP.1.1		N/A	
OCNG Pattern A.3.2.1.1 (OP.			Config 1	OI	P.1	()P.1	
PDSCH Refere	channel		Config 1		1 TDD		-	
CORESET Ref			Config 1	CR.3.	1 TDD		-	
SMTC configur in A.3.11.1 and			Config 1	SM	TC.1	SMTC.1		
PDSCH/PDCC spacing	H subcarrier	kHz	Config 1	1:	20	120		
TRS configurat	tion		Config 1	TRS.2	.1 TDD	N/A		
TCI configurati	on		Config 1		.Config.0	N/A		
EPRE ratio of looks EPRE r	PBCH DMRS PBCH to PBCH PDCCH DMRS PDCCH to B PDSCH DMRS PDSCH DMRS PDSCH to DCNG DMRS DCNG DMRS	dBm/15	Config 1	0			-98	
N_{oc} Note2		kHz Note5		-98			-90	
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	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1	4	4	-Infinity	7	
\hat{E}_s/N_{oc}		dB	Config 1	4 4		-Infinity	7	

Io ^{Note3}		dBm/95	Config 1	-57.55	-57.55	-Infinity	-56.00
		.04				-	
		MHz					
		Note5					
Propagat	tion Condition		Config 1		A'	WGN	
Note 1:	OCNG shall be used spectral density is ac				and a consta	nt total trans	mitted power
Note 2:	Interference from oth	er cells and	d noise sources	not specified	in the test is	s assumed to	be constant
	over subcarriers and	time and s	hall be modelled	l as AWGN o	of appropriate	e power for	N_{oc} to be
	fulfilled.						
Note 3:	SS-RSRP and lo leve	els have be	en derived from	other param	eters for info	ormation purp	ooses. They
	are not settable para	meters thei	nselves.				
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at						
	each receiver antenna port.						
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone						
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone						

A.7.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

160 for UE supporting other power class. In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration #0 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description							
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode							
Note 1: Void.								

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1	1, 2			Two FR1 NR carrier frequencies is	
Number		_					used.
Active cell		Config 1	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel
							number 1.
Neighbour cell		Config 1	NR ce	II 2			NR cell 2 is on NR RF channel
							number 2.
Gap Pattern Id		Config 1	0		13		As specified in clause 9.1.2-1.
Measurement gap		Config 1	39		39		
offset							
SMTC-SSB parameters		Config 1	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6				
Hysteresis	dB	Config 1	0				
CP length		Config 1	Norma	al			
TimeToTrigger	S	Config 1	0				
Filter coefficient		Config 1	0				L3 filtering is not used
DRX		Config 1	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.2	.1	.2	
AoA setup		Config 1,2	Setu	Setu	Setu	Setu	As specified in clause A.3.15
			p 1	р3	p 1	р3	
Time offset between		Config 1	3μs				Synchronous cells.
serving and neighbour							
cells							
T1	S	Config 1	5	1	1	1	
T2	S	Config 1	11	108	11	108	
			for	for	for	for	
			PC1;	PC1;	PC1;	PC1;	
			6.5	67	6.5	67	
			for	for	for	for	
			othe	othe	othe	other	
			r PC	r PC	r PC	PC	

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Parameter		Unit	Test	Ce	ell 1	С	ell 2																
			configuratio	T1 T2		T1	T2																
			n																				
NR RF Channe	el Number		Config 1	1		1		1		1		1		1		1		1		1		2	
Duplex mode			Config 1	Т	DD	TDD																	
TDD configura	tion		Config 1	TDDConf.3.1 TDDCo		TDDConf.3.1																	
BW _{channel}		MHz	Config 1	100: N	100: N _{RB,c} = 66 100: N _{RB,c} =		N _{RB,c} = 66																
BWP BW		MHz	Config 1	100: N	RB,c = 66	100: N	N _{RB,c} = 66																
BWP	Initial DL			DLBV	DLBWP.0.1		N/A																
configuration	BWP		Config 1																				
	Initial UL BWP		Config 1	ULBWP.0.1			N/A																

Dedicated DL BWP			DLBW	/P.1.1	I	N/A	
Dedicated UL BWP			ULBV	/P.1.1		N/A	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1	OP.1		OP.1		
PDSCH Reference measurement channel		Config 1		1 TDD		-	
CORESET Reference Channel		Config 1	CR.3.	1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMT	ГС.1	SN	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1		20		120	
TRS configuration		Config 1	TRS.2	.1 TDD		V/A	
TCI configuration		Config 1		Config.0		V/A	
EPRE ratio of PSS to SSS			121110	· J·-			
to SSS							
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS							
to SSS			0		0		
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)							
N_{oc} Note2	dBm/15 kHz Note5		-6	98	-98		
N_{oc} Note2	dBm/S CS Note4	Config 1	3-	39		-89	
SS-RSRP Note 3	dBm/S CS	Config 1	-85	-85	-Infinity	-82	
^ /r	Note5 dB	Config 1	4	4	-Infinity	7	
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		· ·					
\hat{E}_s/N_{oc}	dB	Config 1	4	4	-Infinity -Infinity	7	
Io ^{Note3}	dBm/95 .04 MHz	Config 1	-57.55	-57.55 -57.55		-56.00	
	Note5						
Propagation Condition		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 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

6560 for UE supporting other power class. In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode
Note: The U	E is only required to be tested in one of the supported test configura	tions

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			Comment				
		configurati on	Test 1	Test 2			
NR RF Channel Number		Config 1,2,3	1, 2		1, 2		Two NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.		
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2,3	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3	39	39			
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1		
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2		
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	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		
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15		
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	5.2 for PC1; 5.2 for PC1; 3.5 for other PC PC				

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Unit Test		ell 1	Cell 2	
		configuratio	T1 T2 T1		T1	T2
		n				
NR RF Channel Number		Config 1,2,3		1	2	
Duplex mode		Config 1	F	DD	TDD	
		Config 2,3	TDD		DD TDI	
TDD configuration		Config 1	Not Ap	Not Applicable		Conf.3.1

			Config 2	TDDC	onf.1.1	TDD	Conf.3.1
			Config 3		onf.2.1		Conf.3.1
BW _{channel}		MHz	Config 1		B,c = 52		$N_{RB,c} = 66$
			Config 2		B,c = 52		$N_{RB,c} = 66$
			Config 3	40: N _{RB}	,c = 106		N _{RB,c} = 66
BWP BW		MHz	Config 1	10: N _{RI}	_{B,c} = 52	100: 1	$N_{RB,c} = 66$
			Config 2	10: N _{RI}	_{B,c} = 52		$N_{RB,c} = 66$
	1		Config 3	40: N _{RB}			$N_{RB,c} = 66$
BWP configuration	Initial DL tion BWP			DLBW	/P.0.1		N/A
	Initial UL BWP		Config 1,2,3	ULBW			N/A
	Dedicated DL BWP		Ooming 1,2,3	DLBW	/P.1.1		N/A
	Dedicated UL BWP			ULBW	/P.1.1		N/A
OCNG Pattern			Config 1,2,3				
A.3.2.1.1 (OP.				OF	P.1		DP.1
PDSCH Refere			Config 1	SR.1.	1 FDD		-
measurement of	channel		Config 2	SR.1.	1 TDD	1	
			Config 3	SR2.1	I TDD		
CORESET Ref	ference		Config 1	CR.1.	1 FDD		-
Channel			Config 2	CR.1.	1 TDD		
			Config 3	CR2.1 TDD		1	
SMTC configur in A.3.11.1 and			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	1	5	120	
spacing			Config 3	3	0		120
EPRE ratio of I	PSS to SSS						
EPRE ratio of I	PBCH DMRS						
	PBCH to PBCH						
	PDCCH DMRS						
EPRE ratio of I			Config 1,2,3	(1	0	
	PDSCH DMRS		Joining 1,2,3	,	,		J
to SSS EPRE ratio of I	PDSCH to						
PDSCH EPRE ratio of 0	OCNG DMRS						
to SSS(Note 1))						
	EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2		dBm/15 kHz Note5 dBm/S		N	А		ΓBD
N_{oc} Note2	$\overline{N_{oc}}$ Note2		Config 1,2 Config 3		NA NA		NA NA
SS-RSRP Note 3	3	Note4 dBm/S	Config 1,2	NA	NA	TBD	TBD
JO-NORF 1300		CS Note5	Config 1,2	NA NA	NA NA	TBD	TBD
\hat{E}_{s}/I_{ot}		dB	Config 1,2,3	NA	NA	TBD	TBD
		I	1		l	1	1

\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	1	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 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode
Note: The l	JE is only required to be tested in one of the supported test configura	tions

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		II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		39		
SMTC-SSB parameters		Config 1	SSB.1				As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1				As specified in clause A.3.10.1
		Config 3	SSB.2				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	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Cell 1			ell 2								
		configuratio	T1	T1 T2		T2								
		n												
NR RF Channel Number		Config 1,2,3		1		2								
Duplex mode		Config 1	F	FDD		ΓDD								
		Config 2,3	Т	DD	TDD									
TDD configuration		Config 1	Not Ap	Not Applicable TDDC		Conf.3.1								
		Config 2	TDDC	TDDConf.1.1		TDDConf.1.1		TDDConf.1.1		TDDConf.1.1		Conf.1.1		Conf.3.1
		Config 3	TDDConf.2.1		TDD	Conf.3.1								
BW _{channel}	MHz	Config 1	10: N _F	10: $N_{RB,c} = 52$ 100: $N_{RB,c}$		$V_{RB,c} = 66$								

			Config 2	10· N _P	B,c = 52	100· N	I _{RB,c} = 66
			Config 3				$I_{RB,c} = 66$ $I_{RB,c} = 66$
BWP BW	RWP RW		Config 1		40: N _{RB,c} = 106 10: N _{RB,c} = 52		$I_{RB,c} = 66$
DVVP DVV		MHz	Config 2		10: N _{RB,c} = 52		$I_{RB,c} = 66$
			Config 3		40: N _{RB,c} = 52		$I_{RB,c} = 66$
BWP	WP Initial DL		Joining 0		VP.0.1		N/A
configuration	BWP		_				
	Initial UL BWP		Config 1,2,3	ULBWP.0.1			N/A
	Dedicated DL BWP		Oomig 1,2,3	DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBV	VP.1.1	1	N/A
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1	
PDSCH Refere	ence		Config 1	SR.1.1 FDD			-
measurement of	channel		Config 2	SR.1.1 TDD		1	
			Config 3	SR2.1 TDD		+	
CORESET Ref	erence		Config 1	CR.1.1 FDD		_	
Channel	0.01100		Config 2	CR.1.1 TDD		· -	
J. 10111101			Config 3	CR2.1 TDD		-	
SMTC configura	ation defined						
in A.3.11.1 and			Config 1	SMTC.2		SMTC.2	
			Config 2,3	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier		kHz	Config 1,2	15		120	
spacing			Config 3	30		120	
EPRE ratio of F	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 1,2,3				
EPRE ratio of F to SSS	PDSCH DMRS						
EPRE ratio of F	PDSCH to						
EPRE ratio of OCNG DMRS							
to SSS(Note 1)	OONO 45						
EPRE ratio of OCNG DMRS (
N_{oc} Note2		dBm/15 kHz		NA		TBD	
		Note5					
$N_{_{\mathit{OC}}}$ Note2		dBm/S CS	Config 1,2 Config 3	NA NA		TBD TBD	
		Note4			· -		
SS-RSRP Note 3		dBm/S	Config 1,2	NA	NA	TBD	TBD
		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.	Config 1,2	NA	NA	_	-

	dBm/38 .16MHz	Config 3	NA	NA	-	-
	dBm/95 .04 MHz	Config 1,2,3	-	-	TBD	TBD
	Note5					
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 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the guiet zone

A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

n this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.7.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,			
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD			
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	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 (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		Config 1	SSB.1 FR1		As specified in clause A.3.10.1	
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1	
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1	
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2	
offsetMO	dB	Config 1,2,3	6			
Hysteresis	dB	Config 1,2,3	0			
a4-Threshold	dBm	Config 1,2,3,4,5,6	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			
AoA setup		Config 1,2	Setup 1		As specified in clause A.3.15	
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		Config 2,3	3μs		Synchronous cells.	
T1	S	Config 1,2,3	5			
T2	S	Config 1,2,3	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC		

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit Test		Ce	II 1	Cell 2		
			configuratio n	T1	T2	T1	T2	
NR RF Channe	el Number		Config 1,2,3	1			2	
Duplex mode			Config 1	FC	FDD		DD	
2 ap.oxoao			Config 2,3	TC			DD	
TDD configura	tion		Config 1	Not App	olicable	TDDO	Conf.3.1	
_			Config 2	TDDC	onf.1.1	TDDO	Conf.3.1	
			Config 3	TDDC	onf.2.1		Conf.3.1	
BW _{channel}		MHz	Config 1	10: N _{RE}			$I_{RB,c} = 66$	
			Config 2	10: N _{RE}			I _{RB,c} = 66	
			Config 3	40: N _{RB}			I _{RB,c} = 66	
BWP BW		MHz	Config 1	10: N _{RE}			$I_{RB,c} = 66$	
			Config 2	10: N _{RE}			I _{RB,c} = 66	
DWD	Lateral DI		Config 3	40: N _{RB}			I _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBW	/P.0.1	Γ	N/A	
	Initial UL BWP		Config 1 2 2	ULBW	/P.0.1	1	N/A	
	Dedicated DL BWP	-	- Config 1,2,3	DLBW	/P.1.1	1	N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A		
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OF	P.1	C	P.1	
PDSCH Refere	ence		Config 1	SR.1.1	1 FDD		-	
measurement	channel		Config 2	SR.1.1	1 TDD	1		
			Config 3	SR2.1				
CORESET Re	ference		Config 1	CR.1.			-	
Channel			Config 2	CR.1.1 TDD				
			Config 3	CR2.1	TDD			
SMTC configuration A.3.11.1 and			Config 1	SMTC.2		SMTC.2		
			Config 2,3	SMT	C.1	SM	ITC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	1	5	1	120	
spacing			Config 3	3	0	1	120	
EPRE ratio of	PSS to SSS	·						
EPRE ratio of to SSS	PBCH DMRS							
	PBCH to PBCH		1					
	PDCCH DMRS							
EPRE ratio of PDCCH DMRS			Config 1,2,3	()		0	
	EPRE ratio of PDSCH DMRS							
EPRE ratio of PDSCH	PDSCH to		1					
EPRE ratio of to SSS(Note 1			1					
EPRE ratio of OCNG DMRS	OCNG to							

N_{oc} Note2	dBm/15 kHz Note5		NA		NA		
N_{oc} Note2	dBm/S CS Note4	Config 1,2 Config 3		NA NA		NA NA	
SS-RSRP Note 3	dBm/S CS Note5	Config 1,2 Config 3	NA NA	NA NA	TBD TBD	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 0 dBi gain at the centre of the guiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.7.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event 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, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD						
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode						
Note: The UE is only required to be tested in one of the supported test configurations								

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test		Va	lue		Comment
		configurati on	Test 1	Test 2	Test 3	Test 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		Config 1	SSB.1				As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1				As specified in clause A.3.10.1
		Config 3	SSB.2				As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3				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	As specified in clause A.3.3
AoA setup		Config 1,2	Setu p 1	Setu p 3	Setu p 1	Setu p 3	As specified in clause A.3.15
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	11 for PC1; 6.5 for othe r PCT BD	108 for PC1; 67 for othe r PCT BD	11 for PC1; 6.5 for othe r PCT BD	108 for PC1; 67 for other PCT BD	

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Ce	ell 1	Cell 2		
		configuratio	T1	T1 T2		T2	
		n					
NR RF Channel Number		Config 1,2,3		1		2	
Duplex mode		Config 1	F	DD	7	TDD	
		Config 2,3	Т	TDD		TDD	
TDD configuration		Config 1	Not Applicable		TDD	Conf.3.1	
		Config 2	TDDConf.1.1		TDDConf.3.1		

BW BW BW BW BW BW BW BW				Config 3	TDDC	onf.2.1	TDD	Conf.3.1		
Config 2	BWchannel		MHz							
BWP BW	0.10.1101									
BWP BW										
Config 2	BWP BW		MHz							
BWP Configuration BWP Initial DL BWP Dedicated DL DEDSCH BWP Dedicated DL DEDSCH DE										
Dedicated DL BWP Dedicated DL BWP Dedicated DL BWP Dedicated UL BWP Dedicated U					40: N _{RE}	_{B,c} = 106				
Initial UL BWP Dedicated DL BWP Dedicated DL BWP Dedicated UL					DLBV	VP.0.1				
Dedicated DL BWP Dedicated UL BWP Dedicated U	3				ULBV	VP.0.1	!	N/A		
Dedicated UL BWP BWP		Dedicated DL		Config 1,2,3	DLBV	VP.1.1	1	N/A		
A.3.2.1.1 (OP.1)					ULBV	VP.1.1	ı	N/A		
Config 2 SR.1.1 TDD Config 3 SR2.1 TDD Config 3 SR2.1 TDD				Config 1,2,3	OI	P.1)P.1		
Config 2 SR.1.1 TDD	PDSCH Refere	ence		Config 1	SR.1.	1 FDD		-		
Config 3	measurement of	channel		-	SR.1	1 TDD	1			
CORESET Reference				_			1			
Config 2	CORESET Ref	ference						-		
Config 3							1			
SMTC configuration defined in A.3.11.1 and A.3.11.2							1			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				Ŭ			SMTC.2			
Spacing				Config 2,3	SMTC.1		SMTC.1			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDSCH/PDCCH subcarrier		kHz	Config 1,2	1	5		120		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				Config 3	3	80		120		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of I	PSS to SSS								
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		PBCH DMRS								
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of I									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS									
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDCCH DMRS	8		Config 1,2,3	(0		0		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	PDSCH									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS(Note 1))								
$N_{oc}^{\text{Note2}} = \begin{array}{c ccccccccccccccccccccccccccccccccccc$										
$N_{oc}^{\text{Note2}} = \begin{pmatrix} \text{dBm/S} & \text{Config 1,2} & \text{NA} & \text{NA} \\ \text{CS} & \text{Config 3} & \text{NA} & \text{NA} \\ \text{Note4} \end{pmatrix}$ $SS-RSRP^{\text{Note 3}} = \begin{pmatrix} \text{dBm/S} & \text{Config 1,2} & \text{NA} & \text{NA} & \text{TBD} & \text{TBD} \\ \text{CS} & \text{Config 3} & \text{NA} & \text{NA} & \text{TBD} & \text{TBD} \\ \text{Note5} & & & & & & & & & & & & & & \\ \hat{E}_s/I_{\text{ot}} = \begin{pmatrix} \hat{I}_{\text{ot}} & \text{NA} & \text{NA} & \text{NA} & \text{NA} & \text{TBD} & \text{TBD} \\ \text{CS} & \text{Config 1,2,3} & \text{NA} & \text{NA} & \text{NA} & \text{TBD} & \text{TBD} \\ \end{pmatrix}$	N_{oc} Note2		kHz		Ν	IA		NA		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	λ 7			Confia 1.2	NA			NA		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	IV Note2 Note2		CS	Config 3						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-RSRP Note 3	1		Config 1,2	NA NA		TBD	TBD		
$\hat{E}_{_{S}}/I_{_{ot}}$ dB Config 1,2,3 NA NA TBD TBD			CS							
\hat{E}_s/N_{oc} dB Config 1,2,3 NA NA TBD TBD	\hat{E}_{s}/I_{ot}			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	Config 1,2,3	-	-	TBD	TBD		
	Note5							
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 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3 L1-RSRP measurement for beam reporting

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

Editor's Note: to be added based on A.5.6.3.1.

A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.7.6.3.1.

A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

Editor's Note: to be added based on A.5.6.3.3.

A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

Editor's Note: to be added based on A.7.6.3.3.

A.7.7 Measurement Performance requirements

A.7.7.1 SS-RSRP

A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 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 A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Davamatar	l lmi4	Test 1				Test 2	
Parameter	Unit	Cell 1	Cell 2			Cell 1	Cell 2
Cell ID		489	0			489	0

SSB ARFCN		fre	:q1		fre	:q1
Duplex mode			DD			DD D
TDD configuration		TDDC				onf.3.1
BW _{channel}	MHz		$R_{B,c} = 66$	T		RB,c = 66
Downlink initial BWP configuration		DLB WP.0.	-		DLB WP.0. 1	-
Downlink dedicated BWP configuration		DLB WP.1.	-		DLB WP.1.	-
Uplink initial BWP configuration		ULB WP.0.	-		ULB WP.0. 1	-
Uplink dedicated BWP configuration		ULB WP.1. 1	-		ULB WP.1. 1	-
DRX cycle configuration		Not applic able	-		Not applic able	-
TRS configuration		TRS.2 .1 TDD	-		TRS.2 .1 TDD	-
TCI state		TCI.St ate.0	-	 	TCI.St ate.0	-
PDSCH Reference measurement channel		SR.3. 1 TDD	-		SR.3. 1 TDD	-
RMSI CORESET Reference Channel		CR.3. 1 TDD	-		CR.3. 1 TDD	-
Control channel RMC		CCR. 3.1 TDD	-		CCR. 3.1 TDD	-
OCNG Patterns		OP.1	OP.1		OP.1	OP.1
SSB configuration		SSB.1 FR2	SSB.1 FR2		SSB.1 FR2	SSB.1 FR2
SMTC configuration		SMTC .1	SMTC .1		SMTC .1	SMTC .1
Time offset with Cell 1	μs	-	3		-	3
PDSCH/PDCCH subcarrier spacing	kHz	120	120		120	120
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS	dB	0	0		0	0
EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1						

\hat{E}_s/N_{oc}	dB	2.846	-0.351			3 ^{Note 5}	-1 ^{Note} 5
Propagation conditions				AW	'GN		
Antenna configuration		1x2					

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for
 - N_{oc} to be fulfilled.
- Note 3: SS-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: No noise is added in this phase of the test.

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Dono	matar	Unit	Tes	st 1	Test 2			
Para	meter	Unit	Cell 1	Cell 2	Cell 1	Cell 2		
Angle of arrival config	nuration			ding to		ding to		
7 angle of annual config	o or annual configuration		section A	1.3.15.2.2	section A	3.15.2.2		
N_{oc} Note1		dBm/15kHz ^N ote4	-94.03		N.	/A		
N_{oc} Note1		dBm/SCS ^{Note}	-85.0		-85.0		N.	/A
\hat{E}_s/N_{oc}		dB	2.85	-0.35	N.	/A		
Es	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}	N	/A	(Table B.2.2-2 spheric al covera ge +3.1dB	(Table B.2.2-2 spheric al covera ge +3.1dB		
SSB_RPNote2	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	-82.15	-85.35	(Table B.2.2-2 spheric al covera ge +3.1dB	(Table B.2.2-2 spheric al covera ge +3.1dB		
$\hat{E}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note6	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	dB	-0.79	-5.56	-5.98	-5.98		
Io ^{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/95.04 MHz ^{Note4}	-50).16	sphe cove	B.2.2-2 erical erage 1dB)		

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:	SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.	
Note 3:	Void	l
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone	l
Note 5:	Void	l
Note 6:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 2dB for UE multi-band relaxation factor Σ MBs from TS 38.101-2 [19] Table	
	6.2.1.3-4.	

Editor's Note: Addition of a high SNR phase during the testing is under consideration. The relative accuracy of cell 1 in high SNR conditions compared with cell 1 in lower SNR conditions and the relative accuracy of cell 2 in high SNR conditions compared with cell 2 in lower SNR conditions would be verified. The angle of arrival of cell 1 and cell 2 should not change when measurements in high SNR conditions are compared with measurements in lower SNR conditions.

A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2.

The absolute accuracy of cell 1 and cell 2 shall be verified in test 1 and test 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

The relative accuracy of cell 2 compared with cell 3 shall be verified in test 1 and test 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Editor's Note: Addition of a high SNR phase during the testing is under consideration. The relative accuracy of cell 1 in high SNR conditions compared with cell 1 in lower SNR conditions and the relative accuracy of cell 2 in high SNR conditions compared with cell 2 in lower SNR conditions would be verified. The angle of arrival of cell 1 and cell 2 should not change when measurements in high SNR conditions are compared with measurements in lower SNR conditions.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement for different UE power classes

	UE power class	Test requirement Note1.2		
1		SSB_RP-TBD-δ-≤Reported RSRP(dB)≤SSB_RP+TBD+ δ dB		
	2	SSB_RP-TBD-δ-≤Reported RSRP(dB)≤SSB_RP+TBD+ δ dB		
3		SSB_RP-22.6-δ-≤Reported RSRP(dB)≤SSB_RP+[20] δ dB		
	4	SSB_RP-TBD-δ-≤Reported RSRP(dB)≤SSB_RP+TBD δ dB		
Note 1:	SSB_RP is the equivalent power received by configured in the test for the cell under consid	an antenna with 0dBi gain at the centre of the quiet zone eration		
Note 2:		from table 10.1.3.1.1-1, e.g. if the requirement B, δ =6 and if the requirement corresponding to the lo		

A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Tes	st 1	Tes	st 2	
Parameter	Coning	Oill	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~2		freq1	freq2	freq1	freq2	
BW _{channel}	1~2		1	100: N _{RB.c} = 66		00: = 66	
Gap pattern ID			()	()	
Duplex mode	1~2		TDD	TDD	TDD	TDD	
TDD configuration	1~2		TDDC	TDDConf.3.1		TDDConf.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		SSB.	1 FR2	SSB.	1 FR2	

	2			2 FR2		2 FR2	
OCNG Patterns	1~2		OF	OP.1		OP.1	
Initial BWP Configuration	1~2			DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~2			/P.1.3 /P.1.3	DLBW ULBW	/P.1.3 /P.1.3	
TRS Configuration	1~2		TRS.2.	.1 TDD	TRS.2	.1 TDD	
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2		TCI.S	tate.2	
SMTC configuration	1~2		SMT	ΓC.1	SMT	ΓC.1	
Time offset between Cell 2 and Cell 3	1~2	μs	3		3		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH 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	1~2	dB	0	0	0	0	
Propagation condition	1~2	-	AW	'GN	AW	GN	
Antenna configuration	1~2	-	1)	x2	1)	(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 $\frac{N_{oc}}{\text{to be fulfilled.}}$

Test 2 NOTE 3 Test 1 **Parameter** Config Unit Cell 1 Cell 2 Cell 1 Cell 2 N_{oc} dBm/15 1~4 TBD n.a. kHz 1,2 dBm/SS **TBD** N_{oc} n.a. **B SCS** 3,4 **TBD** n.a. \hat{E}_{s}/I_{ot} 1~4 dB **TBD TBD** n.a. TBD As in Table B.2.3-2 1,2 dBm/SC SS-RSRPNote1 3,4 S TBD As in Table B.2.3-2 dBm/ Io^{Note1} 95.04M **TBD** SS-RSRP+28.98 1~4 Hz \hat{E}_{s}/N_{oc} 1~4 dB TBD TBD n.a.

Table A.7.7.1.2.2-2: SS-RSRP inter-frequency OTA test parameters

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clauses 10.1.5.1.1 and relative requirements in clause 10.1.5.1.2.

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	120 kHz SSB SCS, 100 MHz
	bandwidth, TDD duplex mode	bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Donomotor	Config	Unit	Test 1		Test 2	
Parameter			Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
	1		10:	•	10:	•	
	'		$N_{RB,c} = 52$		$N_{RB,c} = 52$	100:	
BW _{channel}	2	MHz	10: N = 52	100: N _{RB.c} = 66	10: N _{RB,c} = 52	100: $N_{RB,c} = 66$	
			$N_{RB,c} = 52$ 40:	N _{RB,c} = 00	40:	IN _{RB,c} = 00	
	3		$N_{RB,c} = 106$		N _{RB,c} = 106		
	1		FDD		FDD		
Duplex mode	2		TDD	TDD	TDD	TDD	
	3		TDD		TDD		
	1		N/A		N/A		
TDD#	2		TDDConf.	TDDConf.	TDDConf.	TDDConf.	
TDD configuration			1.1	3.1	1.1 TDDConf.	3.1	
	3		TDDConf. 2.1		2.1		
	1		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference	2		SR.1.1 TDD	_	SR.1.1 TDD	_	
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD		
DMOLOODECET	1		CR.1.1 FDD	-	CR.1.1 FDD	-	
RMSI CORESET	2	1	CR.1.1 TDD	-	CR.1.1 TDD	-	
Reference Channel	3		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Reference Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	1	
Reference Charlie	3		CCR.2.1 TDD	-	CCR.2.1 TDD	1	
	1		SSB.1		SSB.1		
			FR1		FR1		
SSB configuration	2		SSB.1	SSB.1 FR2	SSB.1	SSB.1 FR2	
			FR1		FR1 SSB.2		
	3		SSB.2 FR1		556.2 FR1		
OCNG Patterns	1~3		OP.1		OF	P.1	
Initial BWP	1~3		DLBWP.0.1		DLBW	/P.0.1	
Configuration	1~5			ULBWP.0.1		/P.0.1	
Dedicated BWP	1~3			/P.1.3	DLBWP.1.3		
configuration			ULBW	/P.1.3	ULBWP.1.3		
		i .	TRS.2.1 TDD		TRS.2.1 TDD		
TRS Configuration	1~3		TRS.2.	.1 TDD	TRS.2.	טטו ז	
PDCCH/PDSCH TCI							
PDCCH/PDSCH TCI Configuration	1~3		TCI.S	tate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration				tate.2		tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between	1~3	110	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3	1~3	μs	TCI.S	tate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS	1~3	μs	TCI.S	rtate.2	TCI.S	tate.2	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH 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	1~3 1~3 1~3		TCI.S	rtate.2 ΓC.1	TCI.S SMT	tate.2 C.1	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH 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 PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1	1~3 1~3 1~3	dB	TCI.S SMT	tate.2 FC.1 3	TCI.S SMT	tate.2 C.1 3	
PDCCH/PDSCH TCI Configuration SMTC configuration Time offset between Cell 2 and Cell 3 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH 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	1~3 1~3 1~3		TCI.S SMT	rtate.2 ΓC.1	TCI.S SMT	tate.2 -C.1 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_{oc} to be fulfilled.

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Darameter	Confin	Unit	Test 1		Test 2 NOTE 3	
Parameter	Config	Unit	Cell 1	Cell 2	Cell 1	Cell 2
N_{oc}	1~4	dBm/15 kHz	TBD		n.a.	
N_{oc}	1,2	dBm/SS	TBD		n.a.	
00	3,4	B SCS	TBD		n.a.	
\hat{E}_{s}/I_{ot}	1~4	dB	TBD	TBD	n.a.	
SS-RSRP ^{Note1}	1,2	dBm/SC	TBD		As in Table B.2.3-2	
35-R3RP	3,4	S	TBD		As in Table B.2.3-2	
lo ^{Note1}	1~4	dBm/ 95.04M Hz	TBD		SS-RSRP+	28.98
\hat{E}_s/N_{oc}	1~4	dB	TBD	TBD	n.a.	

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.7.7.2 SS-RSRQ

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description					
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		
	rameter	Offic	Cell 1	Cell 2	Cell 1		
SSB ARFCN			Freq1			eq1	
Duplex mode			TDD			DD	
TDD configuration			TDDConf.3.1		TDDConf.3.1		
BW _{channel}		MHz	100: N _{RE}			RB,c = 66	
Initial DL BWP				DLBW	/P.0.1		
BWP Dedicated DL BWP				DLBW	/P.1.1		
configuration Initial UL BWP				ULBW			
	Dedicated UL BWP			ULBW			
TRS configuration			TRS.2.1		TRS.2.		
Tree cornigaration			TDD		1 TDD		
TCI state			TCI.State		TCI.Sta		
			.0		te.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
			TDD		TDD		
RMSI CORESET R	Reference Channel		CR.3.1	-	CR.3.1		
			TDD		TDD		
Control channel RMC			CCR.3.1 TDD	-	CCR.3. 1 TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration			SMTC.1			01.1	
			SSB.1	SSB.1	SSB.1	SSB.1	
SSB configuration			FR2	FR2	FR2	FR2	
PDSCH/PDCCH su	ubcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measurer	ment			Not Ap	plicable		
EPRE ratio of PSS	to SSS						
EPRE ratio of PBC	H_DMRS to SSS						
EPRE ratio of PBC							
EPRE ratio of PDC							
	CH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDS							
	CH to PDSCH_DMRS						
EPRE ratio of OCN	IG DMRS to SSSNote 1						
	IG to OCNG DMRS Note 1						
\hat{E}_s/N_{oc}		dB	3	3	Note5	Note5	
Propagation condit			AWO	GN	AV	/GN	
Antenna configurat			1x:	_	_	x2	
	hall be used such that bot			d a constar	nt total trans	smitted	
	pectral density is achieved						
	nce from other cells and r						
constant over subcarriers and time and shall be modelled as AWGN of appropriate power for							

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: No noise added in this test 2.

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2

Angle of arrival configuration			According to clause A.3.15.1		According to clause A.3.15.1		
	NR_TDD_FR2_A		ciause i	4.3.15.1			
	NR TDD FR2 B	-			Note7 Note7		
$N_{oc}^{$	NR_TDD_FR2_F	-			Note7 Note7		
	NR_TDD_FR2_G	dBm/15kHz ^N	,	95		te7	
	NR_TDD_FR2_L	ote4	-3	95		te7	
	NR_TDD_FR2_T	-				te7	
	NR_TDD_FR2_Y	-				te7	
	NR_TDD_FR2_A					te7	
	NR_TDD_FR2_B					te7	
17	NR_TDD_FR2_F					te7	
N_{oc} Note1	NR TDD FR2 G	dBm/SCS ^{Note}	ع_	36		te7	
	NR_TDD_FR2_L	3		,0		te7	
	NR_TDD_FR2_T					te7	
	NR_TDD_FR2_Y	1				te7	
	NR_TDD_FR2_A				-128.3+Y ₁	-128.3+Y ₁	
	NR_TDD_FR2_B	dBm/SCS Note4		-83	-127.8+Y ₄	-127.8+Y ₄	
	NR_TDD_FR2_F		-83		-125.8+Y ₄	-125.8+Y ₄	
SS-RSRPNote2	NR_TDD_FR2_G				-125.3+Y₁	-125.3+Y₁	
	NR_TDD_FR2_L				-113.8	-113.8	
	NR_TDD_FR2_T				-112.1	-112.1	
	NR_TDD_FR2_Y				-109.5	-109.5	
	NR_TDD_FR2_A						
	NR_TDD_FR2_B						
	NR_TDD_FR2_F						
SS-RSRQ Note2	NR_TDD_FR2_G	dB	-14.77	-14.77	-13.80	-13.80	
	NR_TDD_FR2_L						
	NR_TDD_FR2_T						
<u> </u>	NR_TDD_FR2_Y				N . =	=	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	-1.76	-1.76	O ^{Note7}	0 ^{Note7}	
	NR_TDD_FR2_A					3+Y ₁	
	NR_TDD_FR2_B					8+Y ₄	
	NR_TDD_FR2_F	dBm/95.04				8+Y ₄	
Io ^{Note2}	NR_TDD_FR2_G	MHz Note4	-5	50		3+Y ₁	
	NR_TDD_FR2_L	ļ ···· · <u>-</u>				1.8	
	NR_TDD_FR2_T				80.1		
N. d. d. d. d.	NR_TDD_FR2_Y	<u> </u>		11 41 :		7.5	
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be							

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 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 6: NR operating band groups are as defined in clause 3.5.2.

Note 7: No noise is added in this test 2.

Note 8: Y1 and Y4 will be defined in Table B.2.1.3.1-1.

A.7.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.8.1.1.

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Parameter	Unit	Tes	st 1	Test 2		
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN		Freq1	freq2	freq1	Freq2	
Duplex mode		TE	DD	TE	DD D	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	
BWchannel	MHz	100: N _F	RB,C = 66	100: N _F	RB,C = 66	
PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1	dB	0	0	0	0	
\hat{E}_s/N_{oc}	dB	-1.75	-1.75	3	-1.75	

- Note 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 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 lmit	Tes	st 1	Test 2		
	meter	Unit	Cell 2 Cell 3		Cell 2	Cell 3	
AoA setup			Set	up 1	Set		
	NR_TDD_FR2_A					Note 7	
$N_{oc}^{$	NR_TDD_FR2_B					e 7	
	NR_TDD_FR2_F	dBm/15kHz ^N	-94	.03	Not	e 7	
	NR_TDD_FR2_G	ote4	54	.00		e 7	
	NR_TDD_FR2_T				Not		
	NR_TDD_FR2_Y				Not		
	NR_TDD_FR2_A					e 7	
Noto1	NR_TDD_FR2_B					e 7	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	-8!	5.0	Not		
	NR_TDD_FR2_G	3		3.0		e 7	
	NR_TDD_FR2_T				Not		
	NR_TDD_FR2_Y			Г	Not	e 7	
	NR_TDD_FR2_A	1					
	NR_TDD_FR2_B	_	-86.75	-86.75			
	NR_TDD_FR2_F	_					
	NR_TDD_FR2_G	_					
	NR_TDD_FR2_T	_				Table	
SSB_RP ^{Note2}	NR_TDD_FR2_Y	dBm/SCS			Table	B.2.2-2	
OOD_IXI		Note4			B.2.2-2	RX	
					RX	beam	
					beam	peak	
					peak	directio	
					directio	n-	
					n+3dB	1.75dB	
	NR_TDD_FR2_A						
	NR_TDD_FR2_B						
SS-RSRQ ^{Note2}	NR_TDD_FR2_F	dB	-14.75	-14.75	-10.8	-10.8	
33-K3KQ****	NR_TDD_FR2_G	uБ	-14.75	-14.75	-10.6	-10.6	
	NR_TDD_FR2_T						
	NR_TDD_FR2_Y						
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	-1.75	-1.75	3	-1.75	
	NR_TDD_FR2_A				Toblo	Table	
	NR_TDD_FR2_B	1			Table B.2.2-2	B.2.2-2	
	NR_TDD_FR2_F	1			RX	RX	
	NR_TDD_FR2_G	dBm/95.04			beam	beam	
Io ^{Note2}	NR_TDD_FR2_T	MHz Note4	-53.8	-53.8	peak	peak	
	NR_TDD_FR2_Y]			directio	directio	
					n +	n +	
					32.0dB	27.25d	
Note 1: Interference	e from other cells and	noine courses a	ot oppoif:	 in the t	t in annum	B	

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, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: NR operating band groups are as defined in Section 3.5.2.

Note 7: No noise is added in this test 2.

A.7.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.7.7.3 SS-SINR

A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. . The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description				
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Doromotor	Unit	Test 1		Test 2			
Parameter		Cell 1	Cell 2	Cell 1	Cell 2		
SSB ARFCN		Freq2		Freq2 F		Fre	eq2

Duplex mode		TDD TDD)D	
TDD configuration		TDDConf.3.1 TDDConf.			onf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66 100: N _{RB,c} =			$_{B,c} = 66$	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration			DLBV	VP.1.1		
Uplink initial BWP configuration			ULBV	VP.0.1		
Uplink dedicated BWP configuration			ULBV	VP.1.1		
DRX cycle configuration	ms			plicable		
TRS configuration			TRS.2	.1 TDD		
TCI state			TCI.S	State.0		
AoA setup		Se	etup 3 defi	ned in A.3.	15	
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
1 DOCT Reference measurement channel		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1		
		TDD		TDD		
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_	
Channel		.1 TDD		1 TDD		
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	
SMTC configuration				TC.1		
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	
		FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measurement			Not Ap	plicable		
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSSNote 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
<u> </u>		1.54	0.00		.	
\hat{E}_s/N_{oc}	dB	4.54	2.66	N/A	N/A	
Propagation conditions		AWGN				
Antenna configuration			1x2			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter		Unit	Test 1		Test 3	
		Onit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration			According to clause A.3.8.X		According to	
					clause A.3.8.X	
	NR_TDD_FR2_A		-105		N	/A
$N_{oc}^{$ Note1	NR_TDD_FR2_B	dBm/15kHz			N/A	
	NR_TDD_FR2_F	Note4			N/A	
	NR_TDD_FR2_G				N/A	
	NR_TDD_FR2_T				N/	/A

	NR TDD FR2 Y				N.	/A
	NR_TDD_FR2_A				N,	/A
	NR_TDD_FR2_B				N,	/A
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS	,	.	N,	/A
	NR_TDD_FR2_G	Note3	-8	96	N,	/A
	NR_TDD_FR2_T				N,	/A
	NR_TDD_FR2_Y				N.	/A
	NR_TDD_FR2_A				Note7	Note7
	NR_TDD_FR2_B				Note7	Note7
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	-91.46	-93.34	Note7	Note7
33-K3KF*****	NR_TDD_FR2_G	Note4	-91.40	-93.34	Note7	Note7
	NR_TDD_FR2_T				Note7	Note7
	NR_TDD_FR2_Y				Note7	Note7
	NR_TDD_FR2_A		0	-3.2	0	0
	NR_TDD_FR2_B	dB			0	0
SS-SINR Note2	NR_TDD_FR2_F				0	0
33-3IIVIX	NR_TDD_FR2_G				0	0
	NR_TDD_FR2_T				0	0
	NR_TDD_FR2_Y				0	0
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	0	-3.2	0	0
	NR_TDD_FR2_A				No	te8
	NR_TDD_FR2_B	dDm/05.04			No	te8
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04 MHz	-59	n 2	No	te8
10	NR_TDD_FR2_G	Note4	-58	9.2	No	te8
	NR_TDD_FR2_T				No	te8
	NR_TDD_FR2_Y				No	te8
	e from other cells and					
	ver subcarriers and tim	e and shall be m	nodelled as	S AWGN of	appropria	te power
for N_{oc} to	be fulfilled.					

- Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: SS_RSRP is applied at level 2dB above the minimum level specified in Table B.2.2-2 for sphereical coverage.
- Note 8: Io is applied at level 10log₁₀(792)+2 dB above the minimum level specified in Table B.2.2-2 for sphereical coverage.

A.7.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.13.1.1.

A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table

A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

	11.74	Te	st 1	Test 2		Test 3	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TI	DD	TE	DD	TDD	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,c = 66	100: N _F	RB,C = 66
Downlink initial BWP configuration				DLBV	/P.0.1		
Downlink dedicated BWP configuration				DLBV	/P.1.1		
Uplink initial BWP configuration				ULBV	/P.0.1		
Uplink dedicated BWP configuration				ULBV	/P.1.1		
DRX cycle configuration	ms			Not ap	plicable		
TRS configuration				TRS.2	.1 TDD		
TCI state				TCI.S	tate.0		
AoA setup			Se	etup 3 defii	ned in A.3.	15	
PDSCH Reference measurement channel		SR.3.1	_	SR.3.1	_	SR.3.1	_
1 DOCT Reference measurement channel		TDD	_	TDD	_	TDD	_
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.
		1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS	dB	0	0	0	0	0	0
EPRE ratio of PDCCH to PDCCH_DMRS	uБ						0
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
Propagation conditions		AWGN					
Antenna configuration				1:	x2		
Note 1: OCNC 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 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Dog	ann of or	Unit	Te	st 1	Te	st 2	Tes	st 3
Par	ameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
			Set	up 1		up 1	Setu	лр 1
Angle of arrival con	figuration	degrees	according to		according to		according to	
			A.3.15.1		A.3.	15.1	A.3.	
	NR_TDD_FR2_A							te7
- Note1	NR_TDD_FR2_B							te7
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz Note4	-1	05	-1	05	No	
	NR_TDD_FR2_G	Note4						te7
	NR_TDD_FR2_T	<u> </u>						te7
	NR_TDD_FR2_Y							te7
	NR_TDD_FR2_A	1						te7
Note1	NR_TDD_FR2_B	(2.2.2					Note7	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS Note3	-96		-96		Note7	
	NR_TDD_FR2_G						Note7 Note7	
	NR_TDD_FR2_T	-						
	NR_TDD_FR2_Y						No.	
	NR_TDD_FR2_A	dBm/SCS				-85	Note8	Note8
	NR_TDD_FR2_B NR_TDD_FR2_F		-96.5				Note8 Note8	Note8 Note8
SS-RSRP ^{Note2}	NR_TDD_FR2_G	Note4		-96.5	-85		Note8	Note8
	NR_TDD_FR2_T	-					Note8	Note8
	NR_TDD_FR2_Y	-					Note8	Note8
	NR_TDD_FR2_A						-3.0	-3.0
	NR_TDD_FR2_B	-					-3.0	-3.0
a a a su sa Nasa o	NR_TDD_FR2_F						-3.0	-3.0
SS-SINR ^{Note2}	NR TDD FR2 G	dB	-0.5	-0.5	11	11	-3.0	-3.0
	NR_TDD_FR2_T						-3.0	-3.0
	NR_TDD_FR2_Y	1					-3.0	-3.0
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-0.5	-0.5	11	11	-3.0	-3.0
	NR_TDD_FR2_A						No	te9
	NR_TDD_FR2_B	dD/05-04					No	te9
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04 MHz	6	9.3	E	E 1	No	te9
10	NR_TDD_FR2_G	IVITZ Note4	-63	ყ.ა	-5:	5.4	No	te9
	NR_TDD_FR2_T]					No	te9
	NR_TDD_FR2_Y						No	te9

- 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-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: Noc for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. Noc for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 3dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 9: lo is applied at level 10log₁₀(792)+6.54dB above the minimum level specified in Table B.2.3-2 for sphereical coverage

A.7.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.15.1.1 and 10.1.15.1.2.

A.7.7.4 L1-RSRP measurement for beam reporting

A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations in each supported band

A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot640	slot640
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
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	1~2	٩D	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1~2	dB	0	U
DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

SS-RSRP+28.98

n.a.

Test 2 NOTE 3 Test 1 **Parameter** Config Unit SSB0 SSB1 SSB0 SSB₁ Angle of arrival configuration Setup 1 according to Setup 1 according to A.3.15.1 A.3.15.1 dBm/15 N_{oc} 1~4 -100 n.a. kHz 1,2 dBm/SS -91 n.a. N_{oc} **B SCS** 3,4 -88 n.a. \hat{E}_{s}/I_{ot} 1~4 10 -2 dB n.a. As in Table B.2.4-2 1,2 dBm/SC -81 -93 SS-RSRPNote1 3,4 S -78 -90 As in Table B.2.4-2 dBm/

-51.57

-2

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

10

95.04M

Hz

dB

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

1~4

1~4

A.7.7.4.1.3 Test Requirements

IoNote1

 \hat{E}_{s}/N_{oc}

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in sections 10.1.20.1.

The reported L1-RSRP value shall include the Rx antenna gain in the range of TBD.

A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD Configuration	1		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1		OP.1	OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.3 ULBWP.1.3	DLBWP.1.3 ULBWP.1.3
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS EDBE ratio of BDSCH DMBS to SSS	1	dB	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS	'	uБ	J	
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.

			Tes	st 1	Test 2	NOTE 3
Parameter	Config	Unit	CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1
Angle of arrival configuration			Setup 1 ac A.3.	ccording to 15.1	Setup 1 according to A.3.15.1	
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~2	dB	10	-2	n.a	١.
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81	-93	As in Table	e B.2.4-2
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-59.86		SS-RSRP+28.98	
\hat{E}_s/N_{oc}	1~2	dB	-51.57	-2	n.a	١.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

A.7.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The reported L1-RSRP value shall include the Rx antenna gain in the range of TBD.

A.8 E-UTRA standalone tests for NR RRM

Editor notes: All NR RRM tests under E-UTRA standalone operations are included in this Annex. All EN-DC related NR RRM tests are in A.6

A.8.1 Void

A.8.2 RRC_IDLE state mobility

A.8.2.1 Inter-RAT NR Cell re-selection

A.8.2.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

A.8.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.8.2.1.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.8.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case

Parameter		Unit	Test	Value	Comment
	1		configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition					phase and during T3 period the UE
TO I	A (* 11		1 0 0 1 5 0	0 110	reselects to cell 2
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cells		1, 2, 3, 4, 5, 6	Cell1	during T3
	Neighbour cells		1, 2, 3, 4, 5, 6	Cell2	
RF Channe	el Number		1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio
					channel (2) are used for this test
Time offset	t between cells		1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells
Access Ba	rring 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 PRACH configuration index			1, 2, 3, 4, 5, 6	87	The detailed configuration is specified in
					TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-
					selection reaction time is taken into
					account.
T2		S	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off,
					and during the off time the physical cell
					identity shall be changed. The intention is
					to ensure that cell 2 has not been
					detected by the UE prior to the start of
					period T3.
T3		S	1, 2, 3, 4, 5, 6	75	T3 needs to be defined so that cell re-
					selection reaction time is taken into
					account.

Table A.8.2.1.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test		Cell 2		
		configuration	T1	T2	T3	
TDD configuration		1, 4		N/A		
		2, 5		TDDConf.1.1		
		3, 6	TDDConf.2.1			
PDSCH Reference		1, 4	SR.1.1 FDD			
measurement channel		2, 5	SR.1.1 TDD			
		3, 6		SR.2.1 TDD		
RMSI CORESET		1, 4	CR.1.1 FDD			
Reference Channel		2, 5	CR.1.1 TDD CR.2.1 TDD			
		3, 6				

Reference Channel	RMC CORESET		1, 4		CCR.1.1 FDD		
3,6 CCR.2.1 TDD							
OCNG Patterns			3.6				
SMTC configuration 1, 2, 3, 4, 5, 6 SMTC.1	OCNG Patterns						
1,4 SSB.1 FR1 2,5 SSB.1 FR1 3,6 SSB.2 FR1 SSB.1 FR1 SSB.2 FR1 SSB.							
Ditable Dita							
Section Sect	CCB comigaration		,				
Initial DL BWP							
configuration Initial UL BWP configuration 1, 2, 3, 4, 5, 6 ULBWP.0.1 RLM-RS 1, 2, 3, 4, 5, 6 SSB Qrxlewnin dBm/SCS 1, 2, 3, 4, 5, 6 SSB Qrystermin dB 1, 2, 3, 4, 5, 6 -1440 3, 6 -137 -1400 -137 Pcompensation dB 1, 2, 3, 4, 5, 6 0 Qhysts dB 1, 2, 3, 4, 5, 6 0 Cell_selection_and_reselection_quality_measurement 5S-RSRP SS-RSRP £_x/I_∞ dB 1, 4 -4 -infinity 12 N _{oc} Note2 dBm/SCS 1, 4 -98 -95 N _{oc} Note2 dBm/15 kHz 1, 4 -98 -95 N _{oc} Note2 dBm/15 kHz 1, 4 -98 -95 SS-RSRP Note3 dBm/SCS 1, 4 -98 -98 2, 5 3, 6 -99 -infinity 12 SS-RSRP Note3 dBm/SCS 1, 4 -102 -infinity -86 2, 5 -102	Initial DL RWP						
Initial UL BWP			1, 2, 0, 4, 0, 0	52577 1011			
configuration RLM-RS 1, 2, 3, 4, 5, 6 SSB Qrxlevmin dBm/SCS 1, 2, 3, 4, 5, 6 -140 3, 6 -137 -140 Bomperation dB 1, 2, 3, 4, 5, 6 0 Qhysts dB 1, 2, 3, 4, 5, 6 0 Qoffsets, n dB 1, 2, 3, 4, 5, 6 0 Cell_selection_and_reselection_quality_measurement 5s-RSRP SS-RSRP & 2, 5 3, 6 -95 Moc 4m/SCS 1, 4 -98 2, 5 -98 -95 Noc 4m/SCS 1, 4 -98 2, 5 -98 -95 Noc 4m/SCS 1, 4 -98 2, 5 3, 6 -95 Noc 4m/SCS 1, 4 -98 2, 5 3, 6 -95 Moc 4m/SCS 1, 4 -4 -infinity 12 Es_x/N_oc dBm/SCS 1, 4 -102 -infinity -86 SS-RSRP Note3			123456		UI RWP 0 1		
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Qrxlevmin dBm/SCS 1, 2, 4, 5 -140 3, 6 -137 Pcompensation dB 1, 2, 3, 4, 5, 6 0 Qhysts dB 1, 2, 3, 4, 5, 6 0 Qoffsets, n dB 1, 2, 3, 4, 5, 6 0 Cell_selection_quality_measurement 1, 2, 3, 4, 5, 6 0 Esselection_quality_measurement 2, 5 -4 -infinity 12 Moc Note2 dBm/SCS 1, 4 -98 -98 -98 -98 3, 6 -95 -98 -95 -98			123456		SSB		
Section		dBm/SCS	1 2 4 5				
Pcompensation dB 1, 2, 3, 4, 5, 6 0 Qhysts dB 1, 2, 3, 4, 5, 6 0 Qoffsets,n dB 1, 2, 3, 4, 5, 6 0 Cell_selection_and_reselection_quality_measurement 1, 2, 3, 4, 5, 6 SS-RSRP E₂, /I₀t dB 1, 4 -4 -infinity 12 Moc Note2 dBm/SCS 1, 4 -98 -95 -98 -95 Noc Note2 dBm/15 kHz 1, 4 -98 -95 -98 -95 -98	Q:XIOVIIIII	uBiii/000					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Pcompensation	dB					
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		u D	1 2 3 4 5 6				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			1, 2, 0, 1, 0, 0		SS-RSRP		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					00.110.11		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		dB	1. 4	-4	-infinity	12	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\mathbf{L}_{\mathrm{s}}/1_{\mathrm{ot}}$	<u></u>					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	λ 7	dBm/SCS	1. 4		-98		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	IV Note2	5-11,700					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			3. 6				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	N 7	dBm/15 kHz					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	IV Note2						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			3. 6				
SS-RSRP Note3 dBm/SCS	\hat{F} /N	dB	1. 4	-4	-infinity	12	
SS-RSRP Note3 dBm/SCS 1, 4 -102 -infinity -86	L_s/V_{oc}	<u></u>					
SS-RSRP Note3 dBm/SCS 1, 4 -102 -infinity -86 2, 5 -102 -infinity -86 3, 6 -99 -infinity -83 Io dBm/9.36 MHz 1, 4 -68.60 -infinity -57.78 dBm/9.36 MHz 2, 5 -68.60 -infinity -57.78 dBm/38.16 MHz 3, 6 -62.50 -infinity -57.78 Treselection s 1, 2, 3, 4, 5, 6 0 0 0 Snonintrasearch dB 1, 2, 3, 4, 5, 6 Not sent Thresh _{x, high} dB 1, 2, 3, 4, 5, 6 48 Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50			3. 6				
2,5	SS-RSRP Note3	dBm/SCS		-102	-infinity	-86	
Sample						-86	
Io dBm/9.36 MHz dBm/9.36 MHz 1, 4 dBm/9.36 MHz -68.60 dBm/9.36 MHz -infinity dBm/9.36 MHz -57.78 dBm/9.36 MHz <t< td=""><td></td><td></td><td>3, 6</td><td></td><td></td><td></td></t<>			3, 6				
dBm/9.36 MHz 2, 5 -68.60 -infinity -57.78 dBm/38.16 MHz 3, 6 -62.50 -infinity -51.69 Treselection s 1, 2, 3, 4, 5, 6 0 0 0 Snonintrasearch dB 1, 2, 3, 4, 5, 6 Not sent Thresh _{x, high} dB 1, 2, 3, 4, 5, 6 48 Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50	lo	dBm/9.36 MHz		-68.60	•		
dBm/38.16 MHz 3, 6 -62.50 -infinity -51.69 Treselection s 1, 2, 3, 4, 5, 6 0 0 0 Snonintrasearch dB 1, 2, 3, 4, 5, 6 Not sent Thresh _{x, high} dB 1, 2, 3, 4, 5, 6 48 Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50							
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			1, 2, 3, 4, 5, 6				
Thresh _{serving, low} dB 1, 2, 3, 4, 5, 6 44 Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50							
Thresh _{x, low} dB 1, 2, 3, 4, 5, 6 50							
				50			
	Propagation Condition		1, 2, 3, 4, 5, 6		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant

over subcarriers and time and shall be modelled as AWGN of appropriate power for $\frac{N_{oc}}{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit	Cell 1			
		T1	T2	T3	
E-UTRA RF Channel number			1		
BW _{channel}	MHz		10		
OCNG Patterns defined in TS 36.133 [15]		OP.2 TDD	for test configur	ation 1, 2, 3;	
clause A.3.2		OP.2 FDD	for test configur	ration 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		
$N_{oc}^{}$ Note 2	dBm/15 kHz		-98		
RSRP Note 3	dBm/15 KHz	-84	-84	-84	
\hat{E}_{s}/I_{ot}	dB	14	14	14	
\hat{E}_s/N_{oc}	dB	14	14	14	
Treselectioneutran	S		0	•	
Snonintrasearch	dB	50			
Threshx, high	dB		48		
Thresh _{serving, low}	dB	44			
Thresh _{x, low}	dB	50			
Propagation Condition			AWGN		
Note 1: OCNG shall be used such that both spectral density is achieved for all C Note 2: Interference from other cells and no	OFDM symbols.		st is assumed to	·	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.8.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR} + T_{SI-NR}$,

Where:

Thigher_priority_search See clause 4.2.2 in TS 36.133 [15]

T_{evaluate. NR} See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.8.3 RRC_CONNECTED state mobility

A.8.3.1 Handover

A.8.3.1.1 E-UTRAN - NR handover in FR1

A.8.3.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements as specified in clause 6.1.2.1 specified in clause 5.3.4 in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.8.3.1.1-1. General test parameters are provided in Table A.8.3.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.8.3.1.1-3 and A.8.3.1.1-4 respectively.

Table A.8.3.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Parameter		Unit	Value	Comment		
NR RF Channel Number			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	E-UTRAN cell		
	Neighbouring cell		Cell 2	NR cell		
Final condition	Active cell		Cell 2			
NR measurement	quantity		SS-RSRP			
E-UTRAN measur	ement quantity		RSRP			
b2-Threshold1		dBm	-84	Absolute E-UTRAN RSRP		
				threshold for event B2		
b2-Threshold2NR		dBm	As specified in Table	Absolute NR SS-RSRP threshold		
			A.8.3.1.1-4	for event B2		
Hysteresis		dB	0			
TimeToTrigger		S	0			
Filter coefficient			0	L3 filtering is not used		
DRX			OFF	Non-DRX test		
Access Barring Information		-	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 8.1.2.1-1		
				started before T2 starts [15]		
T1		S	5			
T2		S	≤5			
T3		S	1			

Table A.8.3.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

Parameter	Unit	Configuration	Cell 1				
		-	T1	T2	Т3		
RF channel number		1, 2, 3, 4, 5, 6	2				
Duplex mode		1, 2, 3	FDD				
		4, 5, 6	TDD				
TDD special subframe configuration ^{Note1}		4, 5, 6	6				
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1				
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25				
				10 MHz: $N_{RB,c} = 50$			
			20 MHz: N _{RB,c} = 100				
PRACH Configuration ^{Note2}		1, 2, 3	4				
		4, 5, 6	53				
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD				
DL Reference Measurement			10 MHz: R.3 FDD				
Channel ^{Note3}			20 MHz: R.6 FDD 5 MHz: R.4 TDD				
		4, 5, 6					
			10 MHz: F		. – –		
DOESO L/DD OOLL/DLUOLL		4.0.0	20 MHz: R.3 TDD				
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD				
parameters:							
DL Reference Measurement Channel ^{Note3}		4.5.0		20 MHz: R.10 FD			
Channel		4, 5, 6		5 MHz: R.11 TDI			
			10 MHz: R.6 TDD 20 MHz: R.10 TDD				
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OP.20 FDD				
1, 2, 3 3 WHZ: OF .20 1 BD							
			l l	U IVII IZ. OP. IU FL	טכ		

			20 MHz: OP.17 FDD			
		4, 5, 6	5 MHz: OP.9 TDD			
			10 MHz: OP.1 TDD			
			20 MHz: OP.7 TDD			
PBCH_RA		1, 2, 3, 4, 5, 6				
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA						
PHICH_RB	dB		0			
PDCCH_RA						
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RA ^{Note4}						
OCNG_RB ^{Note4}						
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-98			
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	7	7	7	
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	7	7	7	
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91	
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91	
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43	
Propagation Condition		1, 2, 3, 4, 5, 6				
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6	1x2 Low			
No. 4 O 11 14		<u> </u>				

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parai	meter	Unit	Configuration	Cell 2			
				T1	T2	T3	
RF channel numb	er		1, 2, 3, 4, 5, 6	1			
Duplex mode			1, 4	FDD			
			2, 3, 5, 6	TDD			
TDD Configuration	n		2, 5		TDDConf.1.1		
			3, 6		TDDConf.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 FDD			
channel			2, 5	SR.1.1 TDD			
			3, 6	SR.2.1 TDD			
CORSET reference	ce channel		1, 4	CR.1.1 FDD			
			2, 5	CR.1.1 TDD			
			3, 6	CR.2.1 TDD			
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6	OP.1			
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1			

	Dedicated DL BWP				DLBWP.1.1		
	Initial UL BWP			ULBWP.0.1			
	Dedicated UL BWP				ULBWP.1.1		
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1			
SSB configuration			1, 2, 4, 5	SSB.1 FR1			
J			3, 6	SSB.2 FR1			
b2-Threshold2NR	b2-Threshold2NR		dDm 1, 2, 4, 5		-105		
		dBm	3, 6	-103			
EPRE ratio of PSS	S to SSS		1, 2, 3, 4, 5, 6				
	CH_DMRS to SSS						
EPRE ratio of PB0	CH to						
PBCH_DMRS							
EPRE ratio of PD	CCH_DMRS to						
SSS							
EPRE ratio of PD	CCH to						
PDCCH_DMRS		dB					
EPRE ratio of PDS	SCH_DMRS to						
SSS							
EPRE ratio of PDS	SCH to						
PDSCH_DMRS							
	NG DMRS to SSS						
EPRE ratio of OC	NG to OCNG						
DMRS		dBm/15 KHz					
N _{oc} Note2	√ _{oc} Note2		1, 2, 3, 4, 5, 6	-98			
N _{oc} Note2		dBm/SCS 1, 2, 4, 5 -98					
			3, 6		-95		
Ê _s /N _{oc}		dB	1, 2, 3, 4, 5, 6	-inifinit	0	0	
Ês/Iot ^{Note3}		dB	1, 2, 3, 4, 5, 6	-inifinit	0	0	
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-inifinit	-98	-98	
			3, 6	-inifinit	-95	-95	
Io ^{Note3}		dBm/9.36 MHz	1, 2, 4, 5	-70.05	-67.04	-67.04	
10.388	10,000		3, 6	-63.96	-60.94	-60.94	
Propagation cond	Propagation condition		1, 2, 3, 4, 5, 6	AWGN		•	
	Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low			
Correlation Matrix			' ' ' '				
	shall be used such	that both calls are	a fully allocated an	d a constant t	otal transmitta	d 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.

Interference from other cells and noise sources not specified in the test is assumed to be constant Note 2: over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Ê_s/I_{ot}, SS-RSRP, and Io levels have been derived from other parameters for information purposes. Note 3:

They are not settable parameters themselves.

A.8.3.1.1.2 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in TS36.331.

 $T_{interrupt} = 210$ ms in the test; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4.3.

This gives a total of 260 ms.

A.8.4 Measurement procedure

A.8.4.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay

A.8.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX

A.8.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.1.1-1 below. Test parameters and cell-specific parameters for the NR cell are provided in Tables A.8.4.1.1.1-2 and A.8.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1.

Table A.8.4.1.1.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.1.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Parameter	Unit	Test	Value		Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6		I	frequencies is used.
NR RF Channel		Config		1	One NR FR1 carrier frequencies is
Number		1,2,3,4,5,6		1	used.
Active cell		Config	C	ell 1	Cell 1 is on E-UTRA RF channel
		1,2,3,4,5,6		;II I	number 1.
Neighbour cell		Config	C	ell 2	Cell 2 is on NR RF channel number
		1,2,3,4,5,6			1.
SMTC-SSB parameters		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 2,5	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 3,6	SSB.	2 FR1	As specified in clause A.3.10.1
CP length		Config	No	rmal	Applicable to both cells.
		1,2,3,4,5,6	INO	IIIai	
DRX		Config	0	FF	DRX is not used
		1,2,3,4,5,6			
Frame time offset	ms	Config 1,2,3,4			Asynchronous cells.
between serving and			3	7	The timing of Cell 2 relative to the
neighbour cells					timing of Cell 1.
μ s Config 5,6		3	Synchronous cells.		
SFN offset between		Config			SFN of Cell 2 relative to SFN of
serving and neighbour		1,2,3,4,5,6	0 1		Cell 1.
cells					
T1	S	Config		1	
		1,2,3,4,5,6	'		

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2
NR RF Channel Number		Config 1,2,3,4,5,6	1
Dunlay made		Config 1,4	FDD
Duplex mode		Config 2,3,5,6	TDD
		Config 1,4	10: N _{RB,c} = 52
BWchannel	MHz	Config 2,5	10: N _{RB,c} = 52
		Config 3,6	40: N _{RB,c} = 106
TDD (' ('		Config 2,5	TDDConf.1.1
TDD configuration		Config 3,6	TDDConf.2.1
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1
SMTC configuration defined		Config 1,4	SMTC.2
in A.3.2.11.1 and A.3.2.11.2		Config 2,3,5,6	SMTC.1
PDSCH/PDCCH subcarrier	1.11=	Config 1,2,4,5	15
spacing	kHz	Config 3,6	30
EPRE ratio of PSS to SSS	dB		
EPRE ratio of PBCH DMRS to SSS	dB		
EPRE ratio of PBCH to PBCH DMRS	dB	Config 1,2,3,4,5,6	0
EPRE ratio of OCNG DMRS to SSS Note 1	dB		
EPRE ratio of OCNG to OCNG DMRS Note 1	dB		
Noc Note2	dBm/15kHz		-98
Noc Note2	4D (0.00	Config 1,2,4,5	-98
Noc 1962	dBm/SCS	Config 3,6	-95
CC DCDD Note 3 4	4D (0.00	Config 1,2,4,5	-94
SS-RSRP Note 3, 4	dBm/SCS	Config 3,6	-91
Ê _s /I _{ot}	dB	Config 1,2,3,4,5,6	4
Ê _s /N _{oc}	dB	Config 1,2,3,4,5,6	4
I Note 2	dBm/9.36MHz	Config 1,2,4,5	-67.11
Io Note 3	dBm/38.16MHz	Config 3,6	-62.27
Propagation Condition	CDITION IDIVITIE	Config 1,2,3,4,5,6	AWGN
	l .		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2 \times TTI_{DCCH}$ longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.1.2 E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX

A.8.4.1.2.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 2 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.2.1-1 below. Test parameters are provided in Tables A.8.4.1.2.1-2 below. Cell-specific parameters for the E-UTRA and NR cells are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1, and Table A.8.4.1.1.1-3 in clause A.8.4.1.1.1, respectively.

Table A.8.4.1.2.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.2.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Parameter	Unit	Test	Va	lue	Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1		One NR FR1 carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	Cell 1		Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	Ce	II 2	Cell 2 is on NR RF channel number 1.
SMTC-SSB parameters		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.	2 FR1	As specified in clause A.3.10.1
CP length		Config 1,2,3,4,5,6	Nor	mal	Applicable to both cells.
DRX		Config 1,2,3,4,5,6	DR	X.4	DRX configuration as specified in clause A.3.3.4
Frame time offset between serving and neighbour cells	ms	Config 1,2,3,4	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μS	Config 5,6	Config 5,6		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	S	Config 1,2,3,4,5,6		1	

A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2 \times TTI_{DCCH}$ longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2 E-UTRA – NR Inter-RAT Measurements

A.8.4.2.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only	required to be tested in one of the supported test configurations.

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit Test Value		Comment		
		configurati on	Test 1	Test 2	
RF Channel Numbers		1, 2, 3, 4, 5, 6	2		One LTE and one FR1 NR carrier frequencies are used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cel	II 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5,	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 6	1	1	

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.1.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.1.1-4

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1	
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD		

		1			
DL Reference Measurement			20 MHz: R		
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
			10 MHz: R	.0 TDD	
			20 MHz: R	.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.	11 FDD	
parameters:			10 MHz: R	.6 FDD	
DL Reference Measurement			20 MHz: R.	10 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.	11 TDD	
		, ,	10 MHz: R	.6 TDD	
			20 MHz: R.	10 TDD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP		
		, ,	10 MHz: OF	.10 FDD	
			20 MHz: OP		
		4, 5, 6	5 MHz: OP		
		, -, -	10 MHz: OF	P.1 TDD	
			20 MHz: OF	P.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6			
PBCH RA		1, 2, 3, 4, 5, 6			
PBCH_RB		, , , , , , , ,			
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA			9		
PDCCH_RB					
PDSCH RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c}	
Io ^{Note5}	UBIII/9IVIHZ	1, 2, 3, 4, 5, 6	-76.22+10log (NRB,c/30)	/50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70	
Antenna Configuration and	1, 2, 3, 4, 5, 6 1x2 Low			OW	
Correlation Matrix Note6					

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 5: \hat{E}_s /I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Ce	ell 2		
		configuration	T1	T2		
NR RF Channel Number		1, 2, 3, 4, 5, 6		1		
Duplex mode		1, 4	FI	OD		
·		2, 3, 5, 6	ΤI	OD		
TDD configuration		2, 5	TDDC	onf.1.1		
		3, 6	TDDC	onf.2.1		
BW _{channel}	MHz	1, 2, 4, 5	10: N _R	в,c = 52		
		3, 6	40: N _{RE}	s,c = 106		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OI	P.1		
SMTC configuration defined in A.3.11.1		1, 4	SM	TC.2		
and A.3.11.2		2, 3, 5, 6	SM	TC.1		
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5		
		3, 6	3	30		
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-(99		
		3, 6	-(96		
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS			0			
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS (Note						
1)						
EPRE ratio of OCNG to OCNG DMRS						
(Note 1)						
N_{oc}^{Note2}	dBm/15kHz	1, 2, 3, 4, 5, 6	-(98		
$N_{oc}^{ m Note2}$	dBm/SCS	1, 2, 4, 5	-(98		
		3, 6	-(95		
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91		
		3, 6	-Infinity	-88		
$\hat{E}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7		
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7		
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38		
	dBm/38.16MH z	3, 6	-Infinity	-61.06		
Propagation Condition		1, 2, 3, 4, 5, 6		U70		
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6		Low		
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and poise sources not specified in the test is assumed to be constant over						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be 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.

A.8.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only	required to be tested in one of the supported test configurations.

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configuratio	Test Test 2 Test Test 4		Test 4		
		n	1		2		
RF Channel		1, 2, 3, 4, 5,		2	2		One LTE and 1 FR1 NR carrier
Number		6	E LITE	A II.4 /DC	> !!\		frequencies are used.
Active cell		1, 2, 3, 4, 5,	E-UIR/	A cell 1 (PC	Jell)		E-UTRA cell 1 is on E-UTRA RF
Neighbour cell		6 1, 2, 3, 4, 5,	NR cell	2			channel number 1. NR cell 2 is on NR RF channel number
		6	INK Cell	2			1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dB	1, 2, 3, 4, 5,	Note 1				E-UTRA RSRP threshold for E-UTRA
	m	6					RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB	1, 2, 3, 4, 5,	Note 2				SS-RSRP threshold for SS-RSRP
	m	6					measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset		1, 4	3ms				Asynchronous cells.
between serving							The timing of Cell 2 is 3ms later than
and neighbour							the timing of Cell 1.
cells		2, 3, 5, 6	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	2	11	2	11	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3							

The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell ²	1	
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.	7 FDD	

[BLB ()		I	40.141. 5	0.555	
DL Reference Measurement			10 MHz: R		
Channel ^{Note2}			20 MHz: R		
		4, 5, 6	5 MHz: R.		
			10 MHz: R		
5051011/550011/5111011			20 MHz: R		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:			10 MHz: R		
DL Reference Measurement			20 MHz: R.		
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
			10 MHz: R		
OON IO Day Moto?		4.0.0	20 MHz: R.		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.		
			10 MHz: OP	-	
		4.5.0	20 MHz: OP		
		4, 5, 6	5 MHz: OP		
				MHz: OP.1 TDD	
bo Theoretical	-ID	4.0.0.4.5.0	20 MHz: OP.7 TDD		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6			
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA	_		_		
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50) -59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lo	OW	
Correlation Matrix Note6					

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Се	II 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	,	1
Duplex mode		1, 4	F	DD
		2, 3, 5, 6	TI)D
TDD configuration		2, 5	TDDC	onf.1.1
-		3, 6	TDDC	onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _R	B,c = 52
		3, 6	40: N _{RB}	,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ΓC.2
and A.3.11.2		2, 3, 5, 6	SM	ГС.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5
		3, 6	3	0
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-(9
		3, 6	-(96
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS			()
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
N_{oc}^{Note2}	dBm/15kHz	1, 2, 3, 4, 5, 6	-(98
$N_{oc}^{$	dBm/SCS	1, 2, 4, 5	-(98
· oc		3, 6	-(95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
\hat{E}_s/I_{ot}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38
	dBm/38.16MH	3, 6	-Infinity	-61.06
B (1 0 10)	Z	4 0 0 4 5 0		170
Propagation Condition		1, 2, 3, 4, 5, 6		J70
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2	Low
Note 1: OCNG shall be used such that the	cell is fully alloca	ted and a constant	total transmitted p	ower spectral

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectra 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.

A.8.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configur	ation Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The	UE is only required to be tested in one of the supported test configurations.

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Parameter Unit Test Value		Comment		
		configurati on	Test 1	Test 2	
RF Channel Numbers		1, 2, 3, 4, 5,		2	One LTE and one FR1 NR carrier
		6			frequencies are used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA ce	ell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5,	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.
		2, 3, 5, 6	3μs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 6	2	1	

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.3.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.3.1-4

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD		

-104		
,		
og (N _{RB,c}		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê_s/l_{ot}, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 2	
		configuration	T1 T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	FDD	
		2, 3, 5, 6		DD
TDD configuration		2, 5		onf.1.1
		3, 6		onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _R	B,c = 52
		3, 6		s,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	O	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ГС.2
and A.3.11.2		2, 3, 5, 6	SM	ΓC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		5
3		3, 6		0 0
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		99
		3, 6	-(96
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS			(0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
$N_{ac}^{ m Note2}$	dBm/15kHz	1, 2, 3, 4, 5, 6	-(98
N_{oc}^{Note2}	dBm/SCS	1, 2, 4, 5	-(98
		3, 6	-(95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38
	dBm/38.16MH	3, 6	-Infinity	-61.06
Propagation Condition	Z	1 2 2 4 5 6	ETI	J70
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6		Low
Matrix		1, 2, 3, 4, 3, 6	IXZ	LUW

A.8.4.2.3.2 **Test Requirements**

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered

Interference from other cells and noise sources not specified in the test is assumed to be constant over Note 2: subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not Note 3: settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only r	equired to be tested in one of the supported test configurations.

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value			Comment		
		configuratio	Test	Test 2	Test	Test 4		
		n	1		2			
RF Channel		1, 2, 3, 4, 5,		2	2		One LTE and 1 FR1 NR carrier	
Number		6					frequencies are used.	
Active cell		1, 2, 3, 4, 5,	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF	
		6					channel number 1.	
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].	
b2-Threshold1	dB	1, 2, 3, 4, 5,	Note 1		ı		E-UTRA RSRP threshold for E-UTRA	
	m	6					RSRP measurement on cell 1 for event B2 [16]	
b2-Threshold2NR	dB	1, 2, 3, 4, 5,	Note 2				SS-RSRP threshold for SS-RSRP	
	m	6					measurement on cell 2 for event B2 [16]	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0					
CP length		1, 2, 3, 4, 5, 6	Normal					
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0					
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used	
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3	
Time offset		1, 4	3ms		•		Asynchronous cells.	
between serving							The timing of Cell 2 is 3ms later than	
and neighbour							the timing of Cell 1.	
cells		2, 3, 5, 6	3μs				Synchronous cells.	
T1	S	1, 2, 3, 4, 5, 6	5					
T2	S	1, 2, 3, 4, 5, 6	2	13	2	13		
Note 1: The value								

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.4.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.4.1-4

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neighbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	, 6 5 MHz: N _{RB,c} = 25	
			10 MHz: N _{RE}	$_{3,c} = 50$
			20 MHz: N _{RB}	,c = 100
PDSCH parameters:		1, 2, 3	5 MHz: R.7	'FDD

_		1			
DL Reference Measurement			10 MHz: R		
Channel ^{Note2}			20 MHz: R		
		4, 5, 6	5 MHz: R.		
			10 MHz: R		
			20 MHz: R.3 TDD		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.	– –	
parameters:			10 MHz: R	.6 FDD	
DL Reference Measurement			20 MHz: R.	10 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.	11 TDD	
			10 MHz: R	.6 TDD	
			20 MHz: R.	10 TDD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.	20 FDD	
			10 MHz: OP	.10 FDD	
			20 MHz: OP	.17 FDD	
		4, 5, 6	5 MHz: OP	.9 TDD	
			10 MHz: OP.1 TDD		
			20 MHz: OP.7 TDD		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH RA					
PDCCH_RB					
PDSCH_RA					
PDSCH RB					
OCNG RA ^{Note3}					
OCNG RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-76.22+10log (N _{RB,c} /50) -59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 L		
Correlation Matrix Note6		, _, _, _, _,	TAL LOW		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Test Cell 2		
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 4	FC)D	
·		2, 3, 5, 6	TDD		
TDD configuration		2, 5	TDDC	onf.1.1	
-		3, 6	TDDC	onf.2.1	
BWchannel	MHz	1, 2, 4, 5	10: N _{RE}	s,c = 52	
		3, 6	40: N _{RB}	c = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF		
SMTC configuration defined in A.3.11.1		1, 4	SMT	C.2	
and A.3.11.2		2, 3, 5, 6	SMT	C.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1		
1 3		3, 6	3		
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-9	9	
		3, 6	-9		
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBCH DMRS to SSS		, , , , ,			
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS			()	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
N Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-9	8	
N_{oc}^{Note2}	dBm/SCS	1, 2, 4, 5	-9	8	
N_{oc}	dbiii/000	3, 6	-9		
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91	
CO NON	dBill/000	3, 6	-Infinity	-88	
\hat{E}_s/I_{ot}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
IoNote3			,		
10,40,60	dBm/9.36MHz	1, 2, 4, 5	-Infinity	-65.38	
	dBm/38.16MH	3, 6	-Infinity	-61.06	
Propagation Condition	Z	1, 2, 3, 4, 5, 6	I ETU	170	
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x2		
Matrix		1, 2, 3, 7, 3, 0	1,72	LOVV	
Note 1: OCNG shall be used such that the	e cell is fully alloca	ted and a constant	total transmitted p	ower spectral	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectra 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.

A.8.4.2.4.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
RF Channel Numbers		1, 2		2 One LTE and one FR2 NR ca frequencies are used.	
Active cell		1, 2	E-UTRA cell	1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs		Synchronous cells.
T1	s	1, 2	10		
T2	S	1, 2	6	3	
Note 1: The value of b	o1-Thres	holdNR is defin	ed in Table A.	8.4.2.5.1-3	

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDDC	Conf.3.1
BWchannel	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	0	P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	20
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2		108
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
AoA setup defined in A.3.15.2.1		1, 2	Setup 2a	
$N_{oc}^{ m Note2}$	dBm/15kHz	1, 2		111
N_{oc}^{Note2}	dBm/SCS	1, 2	-102	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	AV	VGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.

A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measuremen	Measurement reporting delay (ms)				
	Test 1: D1 ms Test 2: D2 ms					
UE power class 3	3200	1600				

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

A.8.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.6.1-1, A.8.4.2.6.1-2 and A.8.4.2.6.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.6.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.6.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.6.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

Cor	nfiguration	Description				
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	1: The UE is only required to be tested in one of the supported test configurations.					

Table A.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	er Unit Test Value			Comment			
		configuratio n	Test 1	Test 2	Test 3	Test 4	
RF Channel Number		1, 2	2				One LTE and 1 FR2 NR carrier frequencies are used.
Active cell		1, 2, 3, 4, 5, 6	, ,			E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.	
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dB m	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.10	DRX. 9	DRX.10	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	6	83	6	83	
Note 1: The value	e of b1-	ThresholdNR is	defined i	n Table A.8	8.4.2.5.1	-3	

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDDC	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	RB,c = 66
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	0	P.1
SMTC configuration defined in A.3.11.1		1	SM	TC.2
and A.3.11.2		2	SM	TC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	20
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	96
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
AoA setup defined in A.3.15.1		1, 2	Setup 1	
N_{oc} Note2	dBm/15kHz	1, 2	-111	
N_{oc}^{Note2}	dBm/SCS	1, 2	-102	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	AV	VGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.

A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)						
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 r						
UE power class 3	4800	51200	4800	51200			

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

A.8.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.7.1-1, A.8.4.2.7.1-2 and A.8.4.2.7.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.7.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.7.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.7.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

Configuration Description						
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only	required to be tested in one of the supported test configurations.				

Table A.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
RF Channel Numbers		1, 2	2		One LTE and one FR2 NR carrier frequencies are used.
Active cell		1, 2	E-UTRA cell	1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs		Synchronous cells.
T1	S	1, 2	5		
T2	S	1, 2	5	3	
Note 1: The value of b	1-Thres	holdNR is defin	ed in Table A.	8.4.2.5.1-3	

Table A.8.4.2.7.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDDC	Conf.3.1
BWchannel	MHz	1, 2	100: N	I _{RB,c} = 66
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	0	P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	20
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	96
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
AoA setup defined in A.3.15.1		1, 2	Setup 1	
N_{oc}^{Note2}	dBm/15kHz	1, 2		111
$N_{oc}^{ m Note2}$	dBm/SCS	1, 2	-102	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
\hat{E}_{s}/I_{ot}	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z			
Propagation Condition		1, 2	AV	VGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.

A.8.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)			
	Test 1: D1 ms	Test 2: D2 ms		
UE power class 3	4160	2080		

A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Configuration Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.	

Table A.8.4.2.8.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Unit	Test	Value			Comment		
		configuratio	Test	Test 2	Test	Test 4		
		n	1		3			
RF Channel		1, 2		2	2		One LTE and 1 FR2 NR carrier	
Number							frequencies are used.	
Active cell		1, 2	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel	
							number 1 as defined in clause A.3.7.2.2.	
Neighbour cell		1, 2	NR cell	2			NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2	0		4		As specified in clause Table 8.1.2.1-1 of	
							TS 36.133 [15].	
Measurement		1, 2	39		19		As specified in TS 36.331 [16].	
gap offset								
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP	
							measurement on cell 2 for event B1 [16]	
Hysteresis	dB	1, 2	0					
CP length		1, 2	Normal					
TimeToTrigger	S	1, 2	0					
Filter coefficient		1, 2	0				L3 filtering is not used	
DRX			DRX.	DRX.10	DRX.	DRX.10	As specified in clause A.3.3	
			9		9			
Time offset		1	3ms				Asynchronous cells.	
between serving							The timing of Cell 2 is 3ms later than the	
and neighbour							timing of Cell 1.	
cells		2	3μs			Synchronous cells.		
T1	S	1, 2	5					
T2	S	1, 2	7	70	7	70		
Note 1: The val	Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.5.1-3							

Table A.8.4.2.8.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Cell 2	
		configuration	T1	T2
NR RF Channel Number		1, 2	1	
Duplex mode		1, 2	TDD	
TDD configuration		1, 2	TDDConf.3.1	
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	OP.1	
SMTC configuration defined in A.3.11.1		1	SMTC.2	
and A.3.11.2		2	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	20
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	96
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
AoA setup defined in A.3.15.1		1, 2	Setup 1	
$N_{oc}^{ m Note2}$	dBm/15kHz	1, 2	-111	
$N_{oc}^{ m Note2}$	dBm/SCS	1, 2	-102	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-88
$\mathbf{\hat{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	14
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	14
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-58.84
	Z		·	
Propagation Condition		1, 2	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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.

A.8.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

Table A.8.4.2.8.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms	Test 3: D3 ms	Test 4: D4 ms	
UE power class 3	6240	66560	6240	66560	

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.5 Measurement performance

A.8.5.1 SFTD accuracy

A.8.5.1.1 SFTD accuracy

A.8.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT FR1 SFTD measurements.

A.8.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.8.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR FR1 target cell. The test parameters of cell 1 are given in clause A.8.5.1.1.2-2. The test parameters of cell 2 are given in Table A.8.5.1.1.2-3. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.8.5.1.1.2-4.

Table A.8.5.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD	
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.8.5.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Unit	Test 1
E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD

TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BWchannel		5 MHz: N _{RB,c} = 25
5. Coldino		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
BE Reference Measurement Chamiles		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel Note2		10 MHz: R.6 FDD
B2 Notoronoo maadaronnon onannoi		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104
Ê _s /N _{oc}	dB dB	-3
Ês/lot	dB	-3
RSRP Note5	dBm/15 kHz	-107
SCH RP Note5	dBm/15 kHz	-107
lo Note5	dBm/Ch BW	-74.45
		+10log
		(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
	olink configuration	s are enecified in table 4.2.1 in TS 26.211 [22]

Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23]. Note 1:

DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] Note 2: respectively.

OCNG shall be used such that all cells are fully allocated and a constant total transmitted power Note 3: 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.

Table A.8.5.1.1.2-3: Test parameters for SFTD accuracy (Cell 2)

Parameter		Config	Unit	Test 1
SSB GSCN		1~6		freq1
Duplex mode		1,4		FDD
		2,5		TDD
		3,6	1	TDD
		1,4		N/A
TDD Confi	guration	2,5	1	TDDConf.1.1
	3 · · · ·	3,6		TDDConf.2.1
		1,4		10: N _{RB,c} = 52
BW _{channel}		2,5	MHz	10: N _{RB,c} = 52
		3,6	1	40: N _{RB,c} = 106
		1,4		SR.1.1 FDD
	eference measurement	2,5	1	SR.1.1 TDD
channel		3,6	1	SR.2.1 TDD
		1,4		CR.1.1 FDD
PMSI COE	RESET Reference Channel	2,5	-	CR.1.1 TDD
KIVISI COP	NESET Reference Chamile		1	CR.2.1 TDD
		3,6		
DMC COD	ICCET Deference Channel	1,4 2,5		CCR.1.1 FDD
RIVIC COR	ESET Reference Channel		-	CCR.1.1 TDD
		3,6		CCR.2.1 TDD
000 (1,4	-	SSB.1 FR1
SSB config	guration	2,5	1	SSB.1 FR1
01470		3,6		SSB.2 FR1
SMTC con		1~6		SMTC.1
	onfiguration	1~6		DLBWP.1.1
	onfiguration	1~6		ULBWP.1.1
OCNG Pat		1~6		OP.1
	o of PSS to SSS	-		
	o of PBCH DMRS to SSS			
	o of PBCH to PBCH DMRS			
	o of PDCCH DMRS to SSS			
	o of PDCCH to PDCCH			
DMRS				
	o of PDSCH DMRS to SSS	1~6	dB	0
	o of PDSCH to PDSCH			
DMRS				
	o of OCNG DMRS to SSS ^{Note}			
1				
	o of OCNG to OCNG DMRS			
Note 1				
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A	_		
	NR_FDD_FR1_B	_		
	NR_TDD_FR1_C			
$N_{oc}^{ m Note2}$	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
oc	NR_TDD_FR1_D		35.11, TORT 12	
	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/SSB SCS	-104
	NR_FDD_FR1_B	1245		
N_{oc} Note2	NR_TDD_FR1_C			
I V oc	NR_FDD_FR1_D,	1,2,4,5		
	NR_TDD_FR1_D	_		
	NR FDD FR1 E,			1
	NR_TDD_FR1_E			
	. – – –		1	i

	ND EDD ED4 C			
	NR_FDD_FR1_G			
	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	3,6		-101
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1~6	dB	-3
\hat{E}_s/N_{oc}		1~6	dB	-3
	ND EDD ED1 A	1~0	QD.	-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	1,2,4,5		-107
	NR_FDD_FR1_E,		- dBm/SCS -	
	NR_TDD_FR1_E	-		
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,	3,6		
	NR_TDD_FR1_A			
I —	NR_FDD_FR1_B			
	NR_TDD_FR1_C			-104
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
<u> </u>	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	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/9.36 MHz	-74.28
	NR_TDD_FR1_D	, , ,		
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
IN NOTES	NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,		dBm/38.16	
	NR_TDD_FR1_D	3,6	MHz	-68.18
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagation of	condition	1~6		AWGN
Antenna conf	figuration	1~6		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 lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.8.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.8.5.2 E-UTRA – NR Inter-RAT Measurement Performance requirements

A.8.5.2.1 SS-RSRP

A.8.5.2.1.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR1 SS-RSRP measurements.

A.8.5.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.1.1.2-2.

Table A.8.5.2.1.1.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.8.5.2.1.1.2-2: SS-RSRP inter-RAT test parameters

Parameter		Unit		st 1		st 2
SSB ARFCN				Cell 2 Cell 2 freq1 freq1		
	Config 1,4		FDD			<u>, d </u>
Duplex mode	Config 2,3,5,6		TDD			
	Config 1,4			Not Ap	plicable	
TDD configuration	Config 2,5			TDDConf.1.1		
	Config 3,6			TDDConf.2.1		
Downlink initial BWP cor	nfiguration			DLBV	VP.0.1	
Downlink dedicated BWI	P configuration			DLBV	VP.1.1	
Uplink initial BWP config	uration			ULBV	VP.0.1	
Uplink dedicated BWP c	onfiguration			ULBV	VP.1.1	
DRX Cycle configuration	1	ms		Not Ap	plicable	
	Config 1,4			TRS.1	.1 FDD	
TRS configuration	Config 2,5			TRS.1	.1 TDD	
	Config 3,6			TRS.1	.2 TDD	
	Config 1,4					
PDSCH Reference measurement channel	Config 2,5			-		-
	Config 3,6					
	Config 1,4					
RMSI CORESET Reference Channel	Config 2,5			-		-
	Config 3,6					
	Config 1,4					
Dedicated CORESET Reference Channel	Config 2,5			-		-
	Config 3,6					
OCNG Patterns	OCNG Patterns			OP.1		
SS-RSSI-Measurement	SS-RSSI-Measurement			Not Applicable		
SMTC configruation				SMTC.1		
000	Config 1,2,4,5			SSB	1 FR1	
SSB configuration	Config 3,6		SSB.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5			,	15	
subcarrier spacing Config 3,6		– kHz			30	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH by BBCH DMBS						
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS		dB	0	0	0	0
EPRE ratio of PDCCH DMRS to 555 EPRE ratio of PDCCH to PDCCH DMRS		7				3
EPRE ratio of PDSCH DMR	RS to SSS					
EPRE ratio of PDSCH to PI	DSCH				1	

		S to SSS(Note 1)					
EPRE ratio	of OCNG to OC	CNG DMRS (Note 1)					
		NR_FDD_FR1_A				-1	17
		NR_TDD_FR1_A					
		NR_FDD_FR1_B				-116.5	
	0 "	NR_TDD_FR1_C	ID (4.5)			-1	16
$N_{oc}^{ m Note2}$	Config	NR_FDD_FR1_D	dBm/15k	-94	.65	-11	5.5
	1,2,4,5	NR_TDD_FR1_D NR_FDD_FR1_E	Hz				
		NR_FDD_FR1_E				-1	15
		NR_FDD_FR1_G				_1	14
		NR_FDD_FR1_H					3.5
		•					s Noc for
	Config 1,2,4	,5		-94	.65		kHz
		NR_FDD_FR1_A					
		NR_TDD_FR1_A				-1	14
		NR_FDD_FR1_B				-11	3.5
$N_{oc}^{ m Note2}$		NR_TDD_FR1_C	dBm/SC			-1	13
1 voc	Config 3,6	NR_FDD_FR1_D	S	-01	.65	_11	2.5
	Coming 5,0	NR_TDD_FR1_D		-31	.00	-11	2.0
		NR_FDD_FR1_E				-1	12
		NR_TDD_FR1_E					
		NR_FDD_FR1_G					11
- A /-		NR_FDD_FR1_H					0.5
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$			dB		0	-	4
\hat{E}_s/N_{oc}	T	LUD EDD ED.	dB	1	0	-	4
	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A		-84.65		-1	21
		NR FDD FR1 B			-12	20.5	
		NR_TDD_FR1_C				20	
		NR_FDD_FR1_D					20
		NR_TDD_FR1_D			-11	9.5	
		NR_FDD_FR1_E					
		NR_TDD_FR1_E				-1	19
		NR_FDD_FR1_G			-1	18	
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SC		-11	7.5	
e3		NR_FDD_FR1_A	S	-81.65	1	24	
		NR_TDD_FR1_A			-1	Z 4	
		NR_FDD_FR1_B					23.5
		NR_TDD_FR1_C				-1	23
	Config 3,6	NR_FDD_FR1_D			65	-12	22.5
	, , , , ,	NR_TDD_FR1_D					
		NR_FDD_FR1_E				-1	22
		NR_TDD_FR1_E NR_FDD_FR1_G	-			1	21
		NR_FDD_FR1_G NR_FDD_FR1_H	1				21 20.5
		NR_FDD_FR1_A				-12	.0.0
		NR_TDD_FR1_A				-87	7.76
		NR_FDD_FR1_B				-87	'.26
		NR_TDD_FR1_C				-	6.76
	Config	NR_FDD_FR1_D	dBm/				
	1,2,4,5	NR_TDD_FR1_D	9.36MHz	-56	.28	-86	5.26
Io ^{Note3}	, , , , , -	NR_FDD_FR1_E	 			_	
		NR_TDD_FR1_E				-85	5.76
		NR_FDD_FR1_G	1			-84	1.76
		NR_FDD_FR1_H					1.26
		NR_FDD_FR1_A	dBm/				1.76
	Config 3,6	NR_TDD_FR1_A	38.16MH	-50	.19		
		NR_FDD_FR1_B	Z			-84	1.26

		NR_TDD_FR1_C			-83.76
		NR_FDD_FR1_D			-83.26
		NR_TDD_FR1_D			00.20
		NR_FDD_FR1_E			-82.76
		NR_TDD_FR1_E			-02.70
		NR_FDD_FR1_G			-81.76
		NR_FDD_FR1_H			-81.26
Propagati	on condition		-	AW	/GN
Antenna o	configuration - 1x2		x2		
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total			nstant 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				
1,010 0.	purposes. They are not settable parameters themselves.				
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and				
1.0.0	noise at each receiver antenna port.				
Note 5:	NR operating band groups are as defined in clause 3.5.2.				

A.8.5.2.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.1.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR2 SS-RSRP measurements.

A.8.5.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-RSRP inter-RAT measurement are tested by using test setup in Table A.8.5.2.1.2.2-2 and Table A.8.5.2.1.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.1.2.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.8.5.2.1.2.2-2: SS-RSRP Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2
Parameter	Unit	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	100: N _{RB,c} = 66	100: $N_{RB,c} = 66$
Downlink initial BWP configuration		DLBW	/P.0.1
Downlink dedicated BWP configuration		DLBW	/P.1.1
Uplink initial BWP configuration		ULBW	/P.0.1
Uplink dedicated BWP configuration		ULBW	/P.1.1
DRX cycle configuration	ms	Not app	olicable
TRS configuration		TRS.2	.1 TDD
TCI state			tate.0
AoA setup		Setup 3 defined in A.3.15	
PDSCH Reference measurement channel		-	-
RMSI CORESET Reference Channel		-	-
OCNG Patterns		OP.1	OP.1
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
\hat{E}_s/N_{oc}	dB	10	N/A

- Note 1: OCNG shall be used such that 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.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

Parameter		Unit	Test 1	Test 2
Fala	raiaineter		Cell 2	Cell 2
			Setup 1	Setup 1
Angle of arrival confi	guration	degrees	according to	according to
			A.3.15.1	A.3.15.1
	NR_TDD_FR2_A			N/A
$N_{oc}^{ m Note1}$	NR_TDD_FR2_B	dBm/15kHz Note4	-100	N/A
	NR_TDD_FR2_F			N/A
	NR_TDD_FR2_G			N/A
	NR_TDD_FR2_T			N/A
	NR_TDD_FR2_Y			N/A
	NR_TDD_FR2_A	dBm/SCS	06	N/A
	NR_TDD_FR2_B	Note3	-96	N/A

$N_{oc}^{ m Note1}$	NR_TDD_FR2_F			N/A
00	NR_TDD_FR2_G			N/A
	NR_TDD_FR2_T			N/A
	NR_TDD_FR2_Y			N/A
	NR_TDD_FR2_A			Note7
	NR_TDD_FR2_B			Note7
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	-85	Note7
	NR_TDD_FR2_G	Note4	-00	Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	11	N/A
	NR_TDD_FR2_A			Note8
	NR_TDD_FR2_B			Note8
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-55.4	Note8
	NR_TDD_FR2_G	MHz Note4	-55.4	Note8
	NR_TDD_FR2_T			Note8
	NR_TDD_FR2_Y	1		Note8
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be				

- 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 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the guiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: SS_RSRP is applied at level the same as the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: Io is applied at level 10log₁₀(792) dB above the minimum level specified in Table B.2.3-2 for sphereical coverage

A.8.5.2.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.2 SS-RSRQ

A.8.5.2.2.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR1 SS-RSRQ measurements.

A.8.5.2.2.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.2.1.2-2.

Table A.8.5.2.2.1.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.8.5.2.2.1.2-2: SS-RSRQ inter-RAT test parameters

Parameter		Unit	Tes Cel			st 2 II 2		st 3 ell 2
SSB ARFCN			fre			eq1		eq1
	Config 1,4			1		DD		
Duplex mode	Config 2,3,5,6		TDD					
	Config 1,4				Not Ap	plicable		
TDD configuration	Config 2,5				TDDC	Conf.1.1		
	Config 3,6				TDDC	Conf.2.1		
Downlink initial BWP cor	nfiguration				DLB\	WP.0.1		
Downlink dedicated BWI	P configuration				DLB\	WP.1.1		
Uplink initial BWP config						WP.0.1		
Uplink dedicated BWP c	onfiguration				ULB\	WP.1.1		
DRX Cycle configuration		ms				plicable		
DITA Cycle configuration	Config 1,4	1113				I.1 FDD		
TRS configuration	Config 2,5					I.1 TDD		
,	Config 3,6					I.2 TDD		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5		-			-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5		-			-		-
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5		-			-		-
	Config 3,6							
OCNG Patterns					0	P.1		
SS-RSSI-Measurement			Not Applicable					
SMTC configruation					SM	TC.1		
	Config 1,2,4,5		SSB.1 FR1					
SSB configuration	Config 3,6		SSB.2 FR1					
DDCCH/DDCCH	Config 1,2,4,5		15					
PDSCH/PDCCH subcarrier spacing	Config 3,6	kHz						
EPRE ratio of PSS to SSS					1 ,	30 T		
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMF		dB	0	0	0	0	0	0
EPRE ratio of PDCCH to P		_		3				
EPRE ratio of PDSCH DMF EPRE ratio of PDSCH to PI	(S to SSS DSCH	_						
EPRE ratio of OCNG DMR		-						
or CONO DIVING	2.3.555(14016-1)	_1	ı		1	L		

EPRE ratio	of OCNG to OC	NG DMRS (Note 1)	1			
L. INE IANO	5. 55115 10 00	NR_FDD_FR1_A		<u> </u>	<u> </u>	
		NR_TDD_FR1_A				-116
		NR_FDD_FR1_B				-115.5
		NR_TDD_FR1_C				-115
$N_{oc}^{ m Note2}$	Config	NR_FDD_FR1_D	dBm/15k	-80.18	-106	
TV _{oc}	1,2,4,5	NR_TDD_FR1_D	Hz	-00.10	-100	-114.5
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-114
		NR_FDD_FR1_G				-113
		NR_FDD_FR1_H				-112.5 Same as Noc for
	Config 1,2,4	,5		-80.18	-106	15kHz
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-113
		NR_FDD_FR1_B				-112.5
$N_{oc}^{ m Note2}$		NR_TDD_FR1_C	dBm/SC			-112
oc	Config 3,6	NR_FDD_FR1_D	S	-83.27	-110	
	<i>J</i> ,	NR_TDD_FR1_D	-			-111.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-111
		NR_FDD_FR1_G	1			-110
		NR_FDD_FR1_H				-109.5
$\hat{\mathbf{E}}_{\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\scriptscriptstyle \mathrm{ot}}$		1	dB	-1.75	-1.75	-1.75
\hat{E}_s/N_{oc}			dB	-1.75	-1.75	-1.75
25/1100		NR_FDD_FR1_A	ub	1.70	1.70	1.70
		NR_TDD_FR1_A				-117.75
	Config	NR_FDD_FR1_B				-117.25
		NR_TDD_FR1_C				-116.75
		NR_FDD_FR1_D		04.00	-107.75	
	1,2,4,5	NR_TDD_FR1_D		-81.93		-116.25
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-115.75
SS-		NR_FDD_FR1_G				-114.75
RSRP ^{Not}		NR_FDD_FR1_H	dBm/SC			-114.25
e3		NR_FDD_FR1_A NR_TDD_FR1_A	S			-114.75
		NR FDD FR1 B				-114.25
		NR_TDD_FR1_C				-113.75
	0	NR_FDD_FR1_D		05.00	444.75	
	Config 3,6	NR_TDD_FR1_D		-85.02	-111.75	-113.25
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-112.75
		NR_FDD_FR1_G				-111.75
		NR_FDD_FR1_H				-111.25
		NR_FDD_FR1_A NR_TDD_FR1_A				
		NR_FDD_FR1_B				
SS-RSRQ Note3		NR_TDD_FR1_C				
	Note3	NR_FDD_FR1_D	4F	4 4 77	40.50	44.70
		NR_TDD_FR1_D	dB	-14.77	-40.59	-14.76
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
	Config	NR_FDD_FR1_A NR_TDD_FR1_A	dBm/			-85.83
Io ^{Note3}	1,2,4,5	NR_FDD_FR1_B	9.36MHz	-50	-75.83	-85.33
1,2,4,5	:,=, :,=	NR_TDD_FR1_C	0.00,,,,,,,			-84.83

		NR_FDD_FR1_D NR_TDD_FR1_D				-84.33
		NR_FDD_FR1_E				-83.83
		NR_TDD_FR1_E				-03.03
		NR_FDD_FR1_G				-82.83
		NR_FDD_FR1_H				-82.33
		NR_FDD_FR1_A				-79.73
		NR_TDD_FR1_A				-13.13
		NR_FDD_FR1_B				-79.23
		NR_TDD_FR1_C	dBm/			-78.73
	Config 3,6	NR_FDD_FR1_D	38.16MH	-50	-76.73	-78.23
	Corning 3,0	NR_TDD_FR1_D	Z 2	-30	-70.73	-70.23
		NR_FDD_FR1_E	_			-77.73
		NR_TDD_FR1_E				-11.13
		NR_FDD_FR1_G				-76.73
		NR_FDD_FR1_H				-76.53
Propagation	Propagation condition		-	AWGN		
Antenna co	onfiguration		-	1x2		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.

A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

A.8.5.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-RAT measurement are tested by using test setup in Table A.8.5.2.2.2-2 and Table A.8.5.2.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.2.2.1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.2.2.2: SS-RSRQ Inter-RAT general test parameters

Devemeter	Unit	Test 1	Test 2
Parameter	Unit	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP configuration		DLBW	/P.0.1
Downlink dedicated BWP configuration		DLBW	/P.1.1
Uplink initial BWP configuration		ULBW	/P.0.1
Uplink dedicated BWP configuration		ULBW	/P.1.1
DRX cycle configuration	ms	Not ap	olicable
TRS configuration		TRS.2	.1 TDD
TCI state			tate.0
AoA setup		Setup 3 defir	ned in A.3.15
PDSCH Reference measurement channel		-	-
RMSI CORESET Reference Channel		-	-
OCNG Patterns		OP.1	OP.1
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSSNote 1			
\hat{E}_s/N_{oc}	dB	-0.5	-1.75

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.2.2.2-3: SS-RSRQ Inter-RAT OTA related test parameters

Down		l locit	Test 1	Test 2
Parameter		Unit	Cell 2	Cell 2
			Setup 1	Setup 1
Angle of arrival confi	guration	degrees	according to	according to
			A.3.15.1	A.3.15.1
	ľ			
	NR_TDD_FR2_A			Note7
Note1	NR_TDD_FR2_B			Note7
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz ^N	-105	Note7
	NR_TDD_FR2_G	ote4	100	Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
	NR_TDD_FR2_A			Note7
Note1	NR_TDD_FR2_B			Note7
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS ^{Note}	-96	Note7
	NR_TDD_FR2_G	3		Note7
	NR_TDD_FR2_T			Note7
	NR_TDD_FR2_Y			Note7
	NR_TDD_FR2_A		-96.5	Note8
	NR_TDD_FR2_B			Note8
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS		Note8
OO NON	NR_TDD_FR2_G	Note4		Note8
	NR_TDD_FR2_T			Note8
	NR_TDD_FR2_Y			Note8
	NR_TDD_FR2_A			-14.82
	NR_TDD_FR2_B			-14.82
SS-RSRQ ^{Note2}	NR_TDD_FR2_F	dB	-14.4	-14.82
00-Norva	NR_TDD_FR2_G] 45	-14.4	-14.82
	NR_TDD_FR2_T			-14.82
	NR_TDD_FR2_Y			-14.82
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	-0.5	-1.75
	NR_TDD_FR2_A			Note 9
	NR_TDD_FR2_B			Note 9
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-63.9	Note 9
10	NR_TDD_FR2_G	MHz Note4	-03.9	Note 9
	NR_TDD_FR2_T			Note 9
	NR_TDD_FR2_Y			Note 9

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{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 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: N_{oc} for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. N_{oc} for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 2.25dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 9: Io is applied at level 10log₁₀(792)+6.22dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

A.8.5.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

In this test case there are two cells on different carriers and measurement gaps are provided

A.8.5.2.3 SS-SINR

A.8.5.2.3.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR1 SS-SINR measurements.

A.8.5.2.3.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.3.1.2-2.

Table A.8.5.2.3.1.2-1: SS- SINR Inter-RAT SS- SINR supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.8.5.2.3.1.2-2: SS-SINR inter-RAT test parameters

Parameter		Unit	Test 1	Test 2	Test 3	
		Oilit	Cell 2	Cell 2	Cell 2	
SSB ARFCN			freq1	freq1	freq1	
Dupley mode	Config 1,4			FDD		
Duplex mode	Config 2,3,5,6			TDD		
	Config 1,4			Not Applicable		
TDD configuration	Config 2,5			TDDConf.1.1		
	Config 3,6		TDDConf.2.1			
Downlink initial BWP cor	nfiguration		DLBWP.0.1			
Downlink dedicated BWP configuration			DLBWP.1.1			
Uplink initial BWP configuration			ULBWP.0.1			
Uplink dedicated BWP c	onfiguration		ULBWP.1.1			
DRX Cycle configuration	1	ms	Not Applicable			
	Config 1,4		TRS.1.1 FDD			
TRS configuration	Config 2,5		TRS.1.1 TDD			
	Config 3,6		TRS.1.2 TDD			
PDSCH Reference measurement channel	Config 1,4			-	-	

		T	I			1		1	
		Config 2,5							
		Config 3,6							
		Config 1,4							
RMSI COR Reference		Config 2,5			-		-		-
		Config 3,6							
		Config 1,4							
Dedicated Reference		Config 2,5			-		-		-
		Config 3,6							
OCNG Pat	terns					0	P.1		
SS-RSSI-N	/leasurement					Not An	plicable		
SMTC con						·	TC.1		
2		Config 1,2,4,5							
SSB config	juration			SSB.1 FR1					
	Config 3,6			SSB.2 FR1					
	PDSCH/PDCCH Config 1,2,4,5		kHz	15					
	subcarrier spacing Config 3,6		11.12			3	30		
	EPRE ratio of PSS to SSS								
EPRE ratio	of PBCH DM	IRS to SSS							
		PBCH DMRS DMRS to SSS							
		PDCCH DMRS	dB	0	0	0	0	0	0
	of PDSCH D		, ab	· ·					O
EPRE ratio	of PDSCH to	PDSCH							
EPRE ratio	of OCNG DI	MRS to SSS ^(Note 1)							
EPRE ratio	of OCNG to	OCNG DMRS (Note 1)							
$N_{oc}^{$	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	dBm/15k Hz	[-8	[-80]		[-108.5]		19.5] 19] 18.5]
		NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						[-1 ⁻	17.5] 16.5] 16]
Config 1,2,4,5			3-]	30]	[-10	8.5]		s Noc for kHz	
$N_{oc}^{$	Config 3,6	NR_FDD_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_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SC S	[-7	77]	[-10	5.5]	[-1 [-1:	16.5] 16] 15.5] 15] 14.5] 14.5]

$\mathbf{\hat{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			dB	[-1.75]	[20]	[-4.0]
\hat{E}_s/N_{oc}			dB	[-1.75]	[20]	[-4.0]
3, 00		NR_FDD_FR1_A NR_TDD_FR1_A				[-123.5]
		NR_FDD_FR1_B				[-123]
		NR_TDD_FR1_C				[-122.5]
	Config	NR_FDD_FR1_D NR_TDD_FR1_D		[-81.75]	[-88.5]	[-122]
	1,2,4,5	NR_FDD_FR1_E				
		NR_TDD_FR1_E				[-121.5]
SS-		NR_FDD_FR1_G				[-120.5]
RSRP ^{Not}		NR_FDD_FR1_H	dBm/SC			[-120]
e3		NR_FDD_FR1_A	S			[-120.5]
		NR_TDD_FR1_A NR_FDD_FR1_B	-			[-120]
		NR TDD FR1 C				[-119.5]
	Canting	NR_FDD_FR1_D		[70 75]	[05 5]	
	Config 3,6	NR_TDD_FR1_D		[-78.75]	[-85.5]	[-119]
		NR_FDD_FR1_E				[-118.5]
		NR_TDD_FR1_E NR_FDD_FR1_G	-			[-117.5]
		NR_FDD_FR1_H				[-117]
	l	NR_FDD_FR1_A				[]
		NR_TDD_FR1_A				
		NR_FDD_FR1_B				
		NR_TDD_FR1_C				
SS-SINR N	lote3	NR_FDD_FR1_D NR_TDD_FR1_D	dB	[-1.75]	[20]	[-4.0]
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
	1	NR_FDD_FR1_H				
		NR_FDD_FR1_A NR_TDD_FR1_A				[-90.09]
		NR_FDD_FR1_B				[-89.59]
		NR_TDD_FR1_C	1		[-60.5]	[-89.09]
	Config	NR_FDD_FR1_D	dBm/	[-49.83]		
	1,2,4,5	NR_TDD_FR1_D	9.36MHz	[-49.00]	[-00.5]	[-88.59]
		NR_FDD_FR1_E				[-88.09]
		NR_TDD_FR1_E NR_FDD_FR1_G				
I Noto?		NR_FDD_FR1_H				[-87.09] [-86.59]
Io ^{Note3}		NR_FDD_FR1_A				-
		NR_TDD_FR1_A				[-84]
		NR_FDD_FR1_B				[-83.5]
		NR_TDD_FR1_C	dBm/			[-83]
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MH	[-43.73]	[-54.41]	[-82.5]
		NR_FDD_FR1_E	Z			1.001
	1	NR_TDD_FR1_E				[-82]
		NR_FDD_FR1_G				[-81]
		NR_FDD_FR1_H			A14/01/	[-80.5]
	on condition		-		AWGN	
Antenna c	onfiguration		-		1x2	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	NR operating band groups are as defined in clause 3.5.2.

A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-RAT measurement are tested by using test setup in Table A.8.5.2.3.2.2-2 and A.8.5.2.3.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.3.2.2-1: SS-SINR Inter-RAT SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.3.2.2-2: SS-SINR Inter-RAT general test parameters

Davamatav	I Imit	Test 1	Test 2	Test 3	
Parameter	Unit	Cell 2	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	freq1	
Duplex mode		TDD	TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	100: N _{RB,c} = 66	
Downlink initial BWP configuration			DLBWP.0.1		
Downlink dedicated BWP configuration			DLBWP.1.1		
Uplink initial BWP configuration			ULBWP.0.1		
Uplink dedicated BWP configuration			ULBWP.1.1		
DRX cycle configuration	ms		Not applicable		
TRS configuration			TRS.2.1 TDD		
TCI state			TCI.State.0		
AoA setup		Se	15		
PDSCH Reference measurement channel		-	-	-	
RMSI CORESET Reference Channel		-	-	-	
OCNG Patterns		OP.1	OP.1	OP.1	
SMTC configuration		SMTC.1 FR2	SMTC.1 FR2	SMTC.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS]				
EPRE ratio of OCNG DMRS to SSSNote 1]				
\hat{E}_s/N_{oc}	dB	-0.5	11.0	-3.0	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.8.5.2.3.2.2-3: SS-SINR Inter-RAT OTA related test parameters

Parameter		Unit	Test 1	Test 2	Test 3
Pa	irameter	Unit	Cell 2	Cell 2	Cell 2
Angle of arrival cor	Angle of arrival configuration		Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1
	NR_TDD_FR2_A				Note7
	NR_TDD_FR2_B				Note7
$N_{oc}^{$	NR_TDD_FR2_F	dBm/15kHz	-105	-105	Note7
	NR_TDD_FR2_G	Note4	-105	-105	Note7
	NR_TDD_FR2_T				Note7
	NR_TDD_FR2_Y				Note7
	NR_TDD_FR2_A				Note7
	NR_TDD_FR2_B				Note7
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS Note3	-96	-96	Note7
	NR_TDD_FR2_G				Note7
	NR_TDD_FR2_T				Note7
	NR_TDD_FR2_Y				Note7
	NR_TDD_FR2_A		-96.5		Note8
	NR_TDD_FR2_B			-85	Note8
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS			Note8
33-K3KF****	NR_TDD_FR2_G	Note4			Note8
	NR_TDD_FR2_T				Note8
	NR_TDD_FR2_Y				Note8
	NR_TDD_FR2_A				-3.0
	NR_TDD_FR2_B				-3.0
SS-SINR ^{Note2}	NR_TDD_FR2_F	dB	-0.5	11	-3.0
33-31NK	NR_TDD_FR2_G	uБ	-0.5	11	-3.0
	NR_TDD_FR2_T				-3.0
	NR_TDD_FR2_Y				-3.0
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-0.5	11	-3.0
	NR_TDD_FR2_A				Note9
	NR_TDD_FR2_B]			Note9
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-69.3	-55.4	Note9
10	NR_TDD_FR2_G	MHz Note4	-09.3	-33. 4	Note9
	NR_TDD_FR2_T]			Note9
	NR_TDD_FR2_Y				Note9
Note 1: Interfere	ence from other cells and	noise sources no	t specified in the tes	st is assumed to be co	onstant over

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: NR operating band groups are as defined in clause 3.5.2.
- Note 7: N_{oc} for SCS 15kHz is applied at level -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for sphereical coverage. N_{oc} for SCS 120kHz is applied at 4 dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 8: SS_RSRP is applied at level 3dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.
- Note 9: Io is applied at level 10log₁₀(792)+6.54dB above the minimum level specified in Table B.2.3-2 for sphereical coverage.

A.8.5.2.3.2.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

Annex B (normative):

Conditions for RRM requirements applicability for operating bands

B.1 Conditions for NR RRC_IDLE state mobility

B.1.1 Introduction

In Annex B.1, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR FDD FR1 H	-120.5	-117.5	

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

		NR		Minimum SSB_RP Note 2, Note 3 dBm / SCS _{SSB}					
Parameter	Angle of arrival	operating bands		SCS _{SSB} =	= 120 kHz		SCS _{SSB} = 240 kHz	dB	
				UE Pow	er class		UE Power class		
			1	2	3	4	1, 2, 3, 4		
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
	Rx Beam Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-4	
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄			
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄			
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			
	Spherical coverage	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4	
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	2-4	
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄			

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.
- NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.1.2-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This clause defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this clause.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this clause.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

B.2.1.1 General

In Annex B.2, the following conditions are specified:

- The conditions for RRC connection release with redirection to NR requirements in clause 6.2.3.2.1,
- The conditions for UE transmit timing adjustment in clause 7.1,
- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 9, UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in clause 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in clause 10.

B.2.1.2 Derivation of Minimum SSB RP values for FR1

[FFS]

B.2.1.3 Derivation of Minimum SSB_RP values for FR2

B.2.1.3.1 Minimum SSB_RP values for Rx Beam Peak angle of arrival

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on Reference sensitivity for the Operating band and for the UE Power class, and taking a baseline of UE Power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = Reference sensitivity $_{PC3,\ n260,\ 50MHz}$ +Y -10Log $_{10}(PRB_{Refsens}\ x\ 12)$ - SNR $_{Refsens}$ + SSB $\hat{E}s/Iot$ + ΣMB_P where:

Reference sensitivity PC3, n260, 50MHz is the reference sensitivity value in dBm specified for Power Class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19].

Y is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.1-1.

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE Power class								
1 2 3 4								
FFS	FFS 9.0 7.0 FFS							

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32.

12 is the number of subcarriers in a PRB.

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB.

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise.

 ΣMB_P is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE Power class 3 in Band n260 is $(-109.5 + \Sigma MB_P)$ dBm/120kHz for intra-frequency measurements and $(-107.5 + \Sigma MB_P)$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

 $For \ Intra-frequency: \ Minimum \ SSB_RP \ (PC_X, \ Band_Y) = -109.5 \ dBm/120kHz + Refsens_{PC_X, \ Band_Y, \ 50MHz} - Refsens_{PC_X,$

 $For \ Inter-frequency: \ Minimum \ SSB_RP \ (PC_X, \ Band_Y) = -107.5 \ dBm/120kHz + Refsens_{PC_X, \ Band_Y, \ 50MHz} - Refsens_{PC_X,$

B.2.1.3.2 Minimum SSB RP values for angle of arrival within Spherical coverage

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS Spherical coverage for the Operating band and for the UE Power class, and taking a baseline of UE Power class 3 in Band n260 with 50 MHz channel bandwidth.

 $\label{eq:minimum SSB_RP} \begin{aligned} &\text{Minimum SSB_RP} = EIS \text{ spherical coverage }_{PC3, \text{ } n260, \text{ } 50\text{MHz}} + Z \text{ } -10Log_{10}(PRB_{Refsens} \text{ } x \text{ } 12) - SNR_{Refsens} + SSB \text{ } \hat{E}s/Iot + \Sigma MBs \end{aligned}$

where:

EIS spherical coverage $_{PC3, n260, 50MHz}$ is the EIS spherical coverage value in dBm specified for Power Class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1.

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1.

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

Value "Z" in dB, for each UE Power class							
1 2 3 4							
FFS 9.0 7.0 FFS							

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32.

12 is the number of subcarriers in a PRB.

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB.

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise.

ΣMB_S is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE Power class 3 in Band n260 is $(-96.9 + \Sigma MB_S)$ dBm/120kHz for intra-frequency measurements and is $(-94.9 + \Sigma MB_S)$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = (-103.9+ Σ MB_S +Z) dBm/120 kHz + Refsens PC_X, Band_Y, 50MHz - Refsens PC_3, n260, 50MHz + Z PC_X - Z PC_3 + Σ MB_S

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = (-101.9+ Σ MB_S +Z) dBm/120 kHz + Refsens PC_X, Band_Y, 50MHz - Refsens PC_3, n260, 50MHz + Z PC_X - Z PC_3 + Σ MB_S

B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm/	SCS _{SSB}	
rarameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	
	NR_FDD_FR1_B	-126.5	-123.5	
Conditions	NR_TDD_FR1_C	-126	-123	` C
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	≥ -6
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	
	NR_FDD_FR1_G	-124	-121	
	NR_FDD_FR1_H	-123.5	-120.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.		·

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

				Minimum SSB_RP Note 2, Note 3					
		ND			dBm / SC	Sssb			
Parameter	Angle of arrival	arrival operating		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	-ID	
		bands		UE Pow	er class		UE Power class	dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
	Rx Beam Peak	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-6	
		n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄			
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8 + Z ₄			
	Spherical	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8 + Z ₄	(Value for SCS _{SSB} = 120	≥-6	
	COVERAGE Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB	_ 0	
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄			

Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

Note 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.2-2:

B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

⁻ The value of Y for Power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively

⁻ The value of Z for Power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

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_RP	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /			
raiailletei	Mix operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB	
		KIIZ	KITZ		
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122		
	NR_FDD_FR1_B	-124.5	-121.5		
Conditions	NR_TDD_FR1_C	-124	-121	S 4	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120		
	NR_FDD_FR1_G	-122	-119		
	NR_FDD_FR1_H	-121.5	-118.5		
NOTE 1:NR	operating band groups are defined in clause	3.5.2.	•		

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

				Minimum SSB_RP Note 2, Note 3						
		ND			dBm / SC	S _{SSB}				
Parameter	Angle of arrival	NR operating		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	JD.		
		bands		UE Pow	er class		UE Power class	dB		
			1	2	3	4	1, 2, 3, 4			
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		≥-4		
	Rx Beam Peak	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCSssB = 120 kHz) +3dB (Value for SCSssB = 120 kHz) +3dB			
		n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄				
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄				
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄				
	Spherical	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄		≥-4		
	COVERAGE Note 1	n260	- 115.3+Z ₁		-94.9	- 111.8+Z ₄		£* 4		
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄				

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

Editor's notes for Table B.2.3-2:

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

⁻ The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively

⁻ The value of Z for Power classes 1 and 4 is FFS, where Z₁, and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.2.4 Conditions for NR L1-RSRP reporting

B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot							
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}								
i arameter	Mix operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB							
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121								
	NR_FDD_FR1_B	-123.5	-120.5								
Conditions	NR_TDD_FR1_C	-123	-120	\ 0							
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -3							
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119								
	NR_FDD_FR1_G	-121	-118								
	NR_FDD_FR1_H	-120.5	-117.5								
NOTE 1:NR	operating band groups are defined in clause	e 3.5.2.		NOTE 1:NR operating band groups are defined in clause 3.5.2.							

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

				Minimum SSB_RP Note 2, Note 3				
		ND			dBm / S	CSssb		
Parameter	Angle of arrival	NR operating bands		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	-ID
		bands		UE Pow	er class		UE Power class	dB
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
	Rx Beam _ Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-3
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄		
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		
	Spherical coverage	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-3
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.1-2:

⁻ The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively

- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1

	ND energting	Minimum CSI-RS_RP						
Parameter	NR operating band groups ^{Note1}		٩D					
	band groups ****	SCS _{CSI-RS} = 15 kHz	SCS _{CSI-RS} = 30 kHz	SCS _{CSI-RS} = 60 kHz	dB			
	NR_FDD_FR1_A,							
	NR_TDD_FR1_A,	-124	-121	-118	1			
	NR_SDL_FR1_A							
	NR_FDD_FR1_B	-123.5	-120.5	-117.5				
	NR_TDD_FR1_C	-123	-120	-117				
Conditions	NR_FDD_FR1_D,	-122.5	-119.5	-116.5	≥ -3			
	NR_TDD_FR1_D	-122.3	-119.5	-110.5				
	NR_FDD_FR1_E,	-122	440	110				
	NR_TDD_FR1_E	-122	-119	-116				
	NR_FDD_FR1_G	-121	-118	-115				
	NR_FDD_FR1_H	-120.5	-117.5	-114.5				

NOTE 1: NR operating band groups are defined in clause 3.5.2.

Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2

				Minim	um CSI-RS	SCELBS	ote 3	CSI-RS Ês/lot
Parameter	Angle of arrival	NR operating			SCS _{CSI-RS} = 120 kHz	ı.		
		bands		UE Power class				dB
			1	2	3	4	1, 2, 3, 4	
	Rx Beam	n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		≥-3
		n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{CSI-RS} = 60 kHz) +3dB	
	Peak	n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄		
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		
	Spherical coverage	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCS _{CSI-RS} = 60	
	Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB	
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S , the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.2-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

		Minimum	SSB 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	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NR	R operating band groups are defined in clause	3.5.2.		

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

				Minin	num SSB_F	RP Note 2, Note 3		SSB Ês/lot
		NB		dBm / SCS _{SSB}				
Parameter	Angle of arrival	NR operating		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	dB
		bands		UE Pow		UE Power class	αь	
			1	2	3	4	1, 2, 3, 4	
	Rx Beam	n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		≥-4
		n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCS _{SSB} = 120	
	Peak	n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄	kHz) +3dB	<u> </u>
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄		
	Spherical coverage	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4
	Note 1	n260	- 115.3+Z ₁		-94.9	- 111.8+Z ₄	kHz) +3dB	=- 4
		n261	-114.3	-100.8	-99.2	- 116.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

- The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.2.6 Conditions for UE transmit timing

B.2.6.1 Conditions for SSB based UE transmit timing

This clause defines the following conditions for UE transmit timing adjustment performed based on SSBs: SSB_RP and SSB Ês/Iot and applicable for a corresponding operating band.

The conditions are defined in Table B.2.6.1-1 for FR1 SSB.

Table B.2.6.1-1: Conditions for SSB based UE transmit timing in FR1

		Minimum	SSB 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, NR_SDL_FR1_A	-124	-121			
	NR_FDD_FR1_B	-123.5	-120.5			
Conditions	NR_TDD_FR1_C	-123	-120	` 0		
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -3		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119			
	NR_FDD_FR1_G	-121	-118			
	NR_FDD_FR1_H	-120.5	-117.5			
NOTE 1: NR operating band groups are defined in clause 3.5.2.						

The conditions are defined in Table B.2.6.1-2 for FR2 SSB.

Table B.2.6.1-2: Conditions for SSB based UE transmit timing in FR2

				Minin	num SSB_	RP Note 2, Note	3	SSB Ês/lot
		. NR		dBm/S				
Parameter	Angle of arrival	operating bands		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	4D
		Danus		UE Pow		UE Power class	dB	
			1	2	3	4	1, 2, 3, 4	
	Rx Beam	n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		≥-3
		n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120	
	Peak	n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄	kHz) +3dB	
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		
	Spherical coverage	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z₄	(Value for SCS _{SSB} = 120	≥-3
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	≥-3
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z₄		

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.
- NOET 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΣMB_P and Spherical coverage values are increased by ΣMB_S, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.6.1-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.2.6.2 Void

B.3 RRM Requirements Exceptions

B.3.1 Introduction

Annex B.3 covers exceptions for side conditions based on receiver sensitivity for CA, DC, and SUL.

B.3.2 Receiver sensitivity relaxation for CA

B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this clause applies for both SC and CA operation.

B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this clause, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.4 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3A.4 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3A.4 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this clause, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.5 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in clause 7.3A.5 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.3 Receiver sensitivity relaxation for DC

B.3.3.1 Receiver sensitivity relaxation for EN-DC

Editor's note: TBD

B.3.3.2 Receiver sensitivity relaxation for NE-DC

Editor's note: TBD

B.3.4 Receiver sensitivity relaxation for SUL

B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3C.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this clause applies for both SC and SUL operation.

B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this clause, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3C.2 of TS 38.101-1 [18], when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3C.2 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3C.2 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.4.1 should not be applied.

Annex C (informative): Change history

	Change history						
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-05	RAN4#83	R4-1706324				Specification skeleton	0.0.1
2017-09						Email approved	0.1.0
2017-09	RAN4-NR AH #3	R4-1709413				Capture TPs approved in the meeting	0.2.0
2017-10	RAN4#84 -Bis	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12	RAN4#85	R4-1714546				Capture TPs approved in RAN4#85	0.4.0
2017-12	RAN#78	RP-172407				v1.0.0 submitted for plenary approval	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0032		В	CR to TS38.133	15.1.0
2018-06	RAN#80	RP-181075	0037		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87	15.2.0
2018-09	RAN#81	RP-181896	0043		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-AH-1807 and RAN4 #88	15.3.0
2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-88bis and RAN4-89	15.4.0
2019-03	RAN#83	RP-190569	0064	1	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90	15.5.0
2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91	15.6.0
2019-09	RAN#85	RP-192022	0084		F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#92 (Rel-15)	15.7.0

History

	Document history					
V15.2.0	July 2018	Publication				
V15.3.0	October 2018	Publication				
V15.4.0	April 2019	Publication				
V15.5.0	July 2019	Publication				
V15.6.0	July 2019	Publication				
V15.7.0	October 2019	Publication				