## ETSITS 138 133 V15.22.0 (2023-07)



5G;

NR;

Requirements for support of radio resource management (3GPP TS 38.133 version 15.22.0 Release 15)



# Reference RTS/TSGR-0438133vfm0 Keywords 5G

#### **ETSI**

650 Route des Lucioles F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

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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:

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

## 1 Scope

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

## 2 References

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

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

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

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

## 3 Definitions, symbols and abbreviations

#### 3.1 Definitions

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## 3.2 Symbols

 $P_{CMAX.c}$ 

SSB\_RP

Srxlev

Squal

Sintrasearch

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

101-2 and 38.101-3

BW <sub>Channel</sub> Ês	Channel bandwidth, defined in TS 38.101-1, 38.101-2 and 38.101-3 subclause 3.2 Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector or radiated interface boundary
$F_{\rm C}$	RF reference frequency on the channel raster, given in table 5.4.2.2-1 in TS 38.101-1 and 38.101-2
$F_{C,low}$	The Fc of the lowest carrier, expressed in MHz
Io	The total received power density, including signal and interference, as measured at the UE antenna connector or radiated interface boundary.
Ioc	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector or radiated interface boundary.
Iot	The received power spectral density of the total noise and interference for a certain RE (power integrated over the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector or radiated interface boundary
$N_{oc}$	The power spectral density of a white noise source (average power per RE normalised to the
	subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector or radiated interface boundary
$n_{\scriptscriptstyle PRB}$	Physical Resource Block number as defined in clause 3.2 in TS 38.211.
$N_{\mathrm{TA}}$	Timing offset between uplink and downlink radio frames at the UE, as defined in clause 4.2 in TS 38.213.
$N_{\mathrm{TA~offset}}$	Fixed timing advance offset, as defined in clause 7.1.2 in TS 38.133.
$P_{ m CMAX}$	Configured UE transmitted power as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3.

Cell Selection Criterion defined in TS 38.304, subclause 5.2.3.2 for NR

measured at the UE antenna connector or radiated interface boundary

Cell selection RX level, defined in TS 38.304, subclause 5.2.3.2

Cell selection quality, defined in TS 38.304, subclause 5.2.3.2

Configured UE transmitted power on a serving cell c as defined in clause 6.2.4 in TS 38.101-1, 38-

Received (linear) average power of the resource elements that carry NR synchronisation burst,

Defined in TS 38.304, subclause 5.2.4.7 for E-UTRAN amd 38.304 subclause 5.2.4.7 for NR

Snonintrasearch Defined in TS 38.304, subclause 5.2.4.7

T<sub>c</sub> Basic time unit, defined in clause 4.1 of TS 38.211 [6].

 $\begin{array}{lll} T_{reselection} & Defined in TS \ 25.304, subclause \ 5.2.6.1.5 \\ T_{reselectionRAT} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionUTRA} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionGERAN} Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionGERAN} Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{x, high}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{serving, low}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{serving, low}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ D_{reselectionGERAN} & D_{reselectionGERAN}$ 

T<sub>s</sub> Reference time unit, defined in clause 4.1 of TS 38.211 [6].

 $\Gamma_{\text{UE re-establish delay}}$  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.

#### 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<sub>SSB</sub> SSB subcarrier spacing
SDL Supplementary Downlink
SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information
SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

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

SSB Synchronization Signal Block

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

measured at the UE antenna connector or radiated interface boundary.

SSS Secondary Synchronization Signal sTAG Secondary Timing Advance Group

SULSupplementary UplinkTATiming AdvanceTAGTiming 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 38.533 [5] defines the test tolerances.

# 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 <sup>4</sup>	NR_TDD_FR1_A	n34, n38, n39, n40, n50, n51	NR_SDL_FR1_A	n75, n76
В	NR_FDD_FR1_B	n66, n74 <sup>3</sup>	NR_TDD_FR1_B	-	NR_SDL_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77 <sup>1</sup> , n78, n79	NR_SDL_FR1_C	-
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77 <sup>2</sup>	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 <sup>1</sup> , n258 <sup>1</sup> , n261 <sup>1</sup>
В	NR_TDD_FR2_B	n257 <sup>4</sup> , n258 <sup>4</sup> , n261 <sup>4</sup>
С	NR_TDD_FR2_C	
D	NR_TDD_FR2_D	
Е	NR_TDD_FR2_E	
F	NR TDD FR2 F	n260 <sup>4</sup>

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 <sup>2</sup> , n258 <sup>2</sup> , n261 <sup>2</sup>
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 <sup>3</sup> , n258 <sup>3</sup> , n261 <sup>3</sup>
U	NR_TDD_FR2_U	
V	NR_TDD_FR2_V	
W	NR_TDD_FR2_W	
X	NR_TDD_FR2_X	
Υ	NR_TDD_FR2_Y	n260 <sup>3</sup>
NOTE 1:	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 PCell, 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 7 UL (or 8 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 8 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 UL in PCell, 1 UL in PSCell.

## 3.6.3 Applicability for intra-band FR2

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

# 3.6.4 Applicability for FR2 UE power classes

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

## 3.6.5 Applicability for SDL bands

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

# 3.6.6 Applicability of requirements for NGEN-DC operation

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

## 3.6.7 Applicability of QCL

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

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

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

# 4 SA: RRC\_IDLE state mobility

## 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 [1]. 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 [1], 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  $\leq 0.64$  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  $N_{\text{serv}}$  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].

DRX cycle length [s] Scaling Factor (N1) N<sub>serv</sub> [number of DRX cycles] FR2Note1 FR1 0.32 8 M1\*N1\*4 5 0.64 M1\*N1\*4 1 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

Table 4.2.2.2-1: N<sub>serv</sub>

# 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[1] 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 in TS38.304 [1] within  $T_{\text{evaluate},NR\_\text{Intra}}$  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 in TS38.304 [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 4.5dB 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<sub>detect,NR Intra</sub>, T<sub>measure,NR Intra</sub> and T<sub>evaluate,NR Intra</sub>

DRX cycle	Scaling Factor (N1)		T <sub>detect,NR_Intra</sub> [S]	Tmeasure,NR_Intra [S]	Tevaluate,NR_Intra
length [s]	FR1	FR2 <sup>Note1</sup>	(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 clause.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS38.304 [1] 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 clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

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

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

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

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 38.304 [1] 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 in TS38.304 [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 6.5dB 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 in TS38.304 [1].

Table 4.2.2.4-1: T<sub>detect,NR</sub> Inter, T<sub>measure,NR</sub> Inter and T<sub>evaluate,NR</sub> Inter

Scaling Factor (I	N1)	

DRX cycle length [s]	FR1	FR2 <sup>Note1</sup>	T <sub>detect,NR_Inter</sub> [s] (number of DRX cycles)	T <sub>measure,NR_Inter</sub> [s] (number of DRX cycles)	T <sub>evaluate,NR_Inter</sub> [s] (number of DRX cycles)
0.32		8	11.52 x N1 x 1.5 (36 x	1.28 x N1 x 1.5 (4 x N1	5.12 x N1 x 1.5 (16 x
			N1 x 1.5)	x 1.5)	N1 x 1.5)
0.64	1	5	17.92x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)
Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle 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 clause apply for inter-RAT E-UTRAN FDD measurements and E-UTRA TDD measurements. When the measurement rules indicate that inter-RAT E-UTRAN cells are to be measured, the UE shall measure RSRP and RSRQ of detected E-UTRA cells in the neighbour frequency list at the minimum measurement rate specified in this clause. The parameter  $N_{EUTRA\_carrier}$  is the total number of configured E-UTRA carriers in the neighbour frequency list. The UE shall filter RSRP and RSRQ measurements of each measured E-UTRA cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least  $T_{measure,EUTRAN}/2$ .

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

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

The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [1] within ( $N_{EUTRA\_carrier}$ ) \*  $T_{detect,EUTRAN}$  when  $Srxlev \leq S_{nonIntraSearchP}$  or  $Squal \leq S_{nonIntraSearchP}$  when  $T_{reselection} = 0$  provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

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

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

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

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

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304 [1] within (N<sub>EUTRA\_carrier</sub>) \* T<sub>evaluate,EUTRAN</sub> when T<sub>reselection</sub> = 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.

T<sub>measure,EUTRAN</sub> [S] DRX T<sub>detect,EUTRAN</sub> [S] T<sub>evaluate,EUTRAN</sub> [s] (number of DRX (number of DRX cycle (number of DRX cycles) length cycles) cycles) [s] 11.52 (36) 1.28 (4) 5.12 (16) 0.32 0.64 17.92 (28) 1.28 (2) 5.12 (8)

1.28 (1)

2.56(1)

6.4 (5) 7.68 (3)

Table 4.2.2.5-1: T<sub>detect,EUTRAN</sub>, T<sub>measure,EUTRAN</sub>, and T<sub>evaluate,EUTRAN</sub>

## 4.2.2.6 Maximum interruption in paging reception

32(25)

58.88 (23)

1.28

2.56

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<sub>SI-EUTRA</sub> 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 [1], allowing the UE to limit its measurement activity.

## 5.1.2 Requirements

## 5.1.2.1 UE measurement capability

The requirements in sub-clause 4.2.2.1 shall apply.

## 5.1.2.2 Measurement and evaluation of serving cell

The requirements in sub-clause 4.2.2.2 shall apply.

## 5.1.2.3 Measurements of intra-frequency NR cells

The requirements in sub-clause 4.2.2.3 shall apply.

## 5.1.2.4 Measurements of inter-frequency NR cells

The requirements in sub-clause 4.2.2.4 shall apply.

## 5.1.2.5 Measurements of inter-RAT E-UTRAN cells

The requirements in sub-clause 4.2.2.5 shall apply.

#### 5.1.2.6 Maximum interruption in paging reception

The requirements in sub-clause 4.2.2.6 shall apply.

### 5.1.2.7 General requirements

The requirements in sub-clause 4.2.2.7 shall apply.

## 5.2 Void

# 6 RRC\_CONNECTED state mobility

## 6.1 Handover

### 6.1.1 NR Handover

#### 6.1.1.1 Introduction

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

#### 6.1.1.2 NR FR1 - NR FR1 Handover

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

### 6.1.1.2.1 Handover delay

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

#### Where:

D<sub>handover</sub> equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

#### 6.1.1.2.2 Interruption time

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

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

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

#### Where:

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

T<sub>processing</sub> is time for UE processing. T<sub>processing</sub> can be up to 20ms.

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

 $T_{\Delta}$  is time for fine time tracking and acquiring full timing information of the target cell.  $T_{\Delta} = T_{rs}$  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 cellin the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the

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

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

#### 6.1.1.3 NR FR2- NR FR1 Handover

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

#### 6.1.1.3.1 Handover delay

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

Where:

D<sub>handover</sub> equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.3.2.

#### 6.1.1.3.2 Interruption time

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

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

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

Where:

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

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

T<sub>processing</sub> is time for UE processing. T<sub>processing</sub> can be up to 40ms.

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

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

 $T_{rs}$  is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise  $T_{rs}$  is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC,  $T_{rs}$  is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with  $T_{rs}$ =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

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

#### 6.1.1.4 NR FR2- NR FR2 Handover

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

#### 6.1.1.4.1 Handover delay

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

#### Where:

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

## 6.1.1.4.2 Interruption time

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

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

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

#### Where:

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

T<sub>processing</sub> is time for UE processing. T<sub>processing</sub> can be up to 20ms.

T<sub>margin</sub> is time for SSB post-processing. T<sub>margin</sub> can be up to 2ms.

 $T_{\Delta}$  is time for fine time tracking and acquiring full timing information of the target cell.  $T_{\Delta} = T_{rs}$  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 such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with  $T_{rs}$ =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command,  $T_{rs}$  follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

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

- During the last 5 seconds before the reception of the handover command:
  - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.2 for intra-frequency cell and in clause 9.3 for inter-frequency cell.
- 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 9.2 for intra-frequency cell and in clause 9.3 for interfrequency cell.

otherwise it is unknown.

#### 6.1.1.5 NR FR1- NR FR2 Handover

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

#### 6.1.1.5.1 Handover delay

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

Where:

D<sub>handover</sub> equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.5.2.

#### 6.1.1.5.2 Interruption time

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

When inter-frequency handover is commanded, the interruption time shall be less than T<sub>interrupt</sub>

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

Where:

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

T<sub>processing</sub> is time for UE processing. T<sub>processing</sub> can be up 40ms.

T<sub>margin</sub> is time for SSB post-processing. T<sub>margin</sub> can be up to 2ms.

 $T_{\Delta}$  is time for fine time tracking and acquiring full timing information of the target cell.  $T_{\Delta} = T_{rs}$  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 such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with  $T_{rs}$ =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

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

- During the last 5 seconds before the reception of the handover command:
  - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

### 6.1.2 NR Handover to other RATs

#### 6.1.2.1 NR – E-UTRAN Handover

#### 6.1.2.1.1 Introduction

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

### 6.1.2.1.2 Handover delay

When the UE receives a RRC message implying handover to E-UTRAN the UE shall be ready to start the transmission of the uplink PRACH channel in E-UTRA within  $D_{handover}$  ms 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<sub>RRC\_procedure\_delay</sub>: 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 T<sub>interrupt</sub>

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

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<sub>IU</sub> 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:

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

 $T_{UL\_grant}$ : 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<sub>UE\_re-establish\_delay</sub>) 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:

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{N_{freq}-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

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

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

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

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

 $T_{identify\_intra\_NR}$ : It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the 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 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<sub>PRACH</sub>: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T<sub>PRACH</sub> can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 $N_{\text{freq}}$ : 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	FR of target NR	Tidentify_intra_NR [ms]				
SSB Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 5 x T <sub>SMTC</sub> )	MAX (800 ms, 10 x T <sub>SMTC</sub> )			
≥ -8	FR2	N/A	MAX (1000 ms, 80 x T <sub>SMTC</sub> ))			
< -8	FR1	N/A	800 <sup>Note1</sup>			
< -8	FR2	N/A	3520 <sup>Note1</sup>			
Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when T <sub>SMTC</sub> > 20 ms and						
serving cell SSB Ês/lot < -8 dB.						

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

Serving cell SSB	FR of target NR	Tidentify_inter_NR, i [ms]				
Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 6 x T <sub>SMTC, i</sub> )	MAX (800 ms, 13 x Т <sub>SMTC, і</sub> )			
≥ -8	FR2	N/A	MAX (1000 ms, 104 x T <sub>SMTC, i</sub> ))			
< -8	FR1	N/A	800 <sup>Note1</sup>			
< -8	FR2	N/A 4000 <sup>Note1</sup>				
	100					

## 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 FR1 and in Table 6.3.4.2-1 of TS 38.101-2 [19] for FR2. 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 FR1 and clause 6.3.4.3 of TS38.101-2 [19] for FR2.

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

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

### 6.2.2.2.1 Contention based random access

#### 6.2.2.2.1.1 Correct behaviour when transmitting Random Access Preamble

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB if the association between Random Access Preambles and SSB is configured, as specified in clause 5.1.2 in TS 38.321 [7].

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

#### 6.2.2.2.1.2 Correct behaviour when receiving Random Access Response

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

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

#### 6.2.2.2.1.3 Correct behaviour when not receiving Random Access Response

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

#### 6.2.2.2.1.4 Correct behaviour when receiving an UL grant for msg3 retransmission

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

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

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

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

## 6.2.2.2.1.6 Correct behaviour when contention Resolution timer expires

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

#### 6.2.2.2.2 Non-Contention based random access

#### 6.2.2.2.2.1 Correct behaviour when transmitting Random Access Preamble

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

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* 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 *rsrp-ThresholdCSI-RS* 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  $T_{\text{connection release redirect NR}}$ .

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

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

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

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

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

#### 6.2.3.2.2 RRC connection release with redirection to E-UTRAN

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

The time delay (T<sub>connection\_release\_redirect\_E-UTRA</sub>) 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<sub>connection\_release\_redirect\_E-UTRA</sub>) 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<sub>RRC\_procedure\_delay</sub>: 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<sub>identify-E-UTRA</sub>: 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<sub>RACH</sub>: It is the delay caused due to the random access procedure when sending random access to the target E-UTRA

# 7 Timing

# 7.1 UE transmit timing

## 7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the reference cell in connected state. The uplink frame transmission takes place  $(N_{TA} + N_{TA}) \times T_c$  before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. For serving cell(s) in pTAG, UE shall use the SpCell as the reference cell for deriving the UE transmit timing for cells in the pTAG. For serving cell(s) in sTAG, UE shall use any of the activated SCells as the reference cell for deriving the UE transmit timing for the cells in the sTAG. UE initial transmit timing accuracy and gradual 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  $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$ . 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.  $N_{\text{TA}}$  for PRACH is defined as 0.

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

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals (kHz)	Te		
		15	12*64*T <sub>c</sub>		
	15	30	10*64*T <sub>c</sub>		
1	ĺ	60	10*64*T <sub>c</sub>		
1	30	15	8*64*T <sub>c</sub>		
		30	8*64*T <sub>c</sub>		
		60	7*64*T <sub>c</sub>		
	120 240	60	3.5*64*T <sub>c</sub>		
0		120	3.5*64*T <sub>c</sub>		
2		60	3*64*T <sub>c</sub>		
		120	3*64*T <sub>c</sub>		
Note 1: T <sub>c</sub> is the basic timing unit defined in TS 38.211 [6]					

Table 7.1.2-1: Te Timing Error Limit

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

Freque	ncy range and band of cell used for uplink transmission	N <sub>TA offset</sub> (Unit: Tc)			
	band without LTE-NR coexistence case or	25600 (Note 1)			
FR1 TDD	band without LTE-NR coexistence case				
FR1 FDD	band with LTE-NR coexistence case	0 (Note 1)			
FR1 TDD	band with LTE-NR coexistence case	39936 (Note 1)			
FR2		13792			
Note 1:	The UE identifies $N_{ m TA~offset}$ based on the infor	mation n-			
	TimingAdvanceOffset as specified in TS 38.33	1 [2]. If UE is not provided			
	with the information n-TimingAdvanceOffset, the default value of $N_{ m TA~offset}$				
is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] and the value 39936 of $N_{\rm TAoffset}$ can also be provided for a FDD serving cell.					
Note 2:		idea for a f DD serving cen.			
Note 2:	Void				

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

#### Table 7.1.2-3: void

## 7.1.2.1 Gradual timing adjustment

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

1) The maximum amount of the magnitude of the timing change in one adjustment shall be Tq.

- 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<sub>q</sub> Maximum Autonomous Time Adjustment Step and T<sub>p</sub> Minimum Aggregate Adjustment rate

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

### 7.1.2.2 Void

Table 7.1.2.2-1: Void

# 7.2 UE timer accuracy

## 7.2.1 Introduction

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

## 7.2.2 Requirements

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

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

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

**Table 7.2.2-1** 

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

# 7.3 Timing advance

## 7.3.1 Introduction

The timing advance is initiated from gNB to UE in EN-DC, NR-DC, NE-DC and NR SA operation modes, with MAC message that implies the 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 <sub>c</sub>	±256 T <sub>c</sub>	±128 T <sub>c</sub>	±32 T <sub>c</sub>

# 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 or radiated interface boundaries shall be better than 3 µs.

# 7.5 Maximum Transmission Timing Difference

## 7.5.1 Introduction

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

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

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

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

# 7.5.2 Minimum Requirements for inter-band EN-DC

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

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

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (μs)	
15	15	500	
15	30	250	
15	60	125	
15	120 <sup>Note1</sup>	62.5	
NOTE 1: For E LITEA EDD ND EDD intro bond EN DC for which the			

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

**Table 7.5.2-2 Void** 

## 7.5.2.1 Minimum Requirements for inter-band synchronous EN-DC

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

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

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

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

# 7.5.3 Minimum Requirements for intra-band EN-DC

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

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

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

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

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	5.21 Note 1, Note 2
15	30	5.21 <sup>Note 2</sup>
15	60	5.21 Note 2

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

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

# 7.5.4 Minimum Requirements for NR Carrier Aggregation

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

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

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

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

# 7.5.5 Minimum Requirements for inter-band NE-DC

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

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

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

Table 7.5.5-2: Void

### 7.5.5.1 Minimum Requirements for inter-band synchronous NE-DC

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

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

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

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

30	15	35.21
60	15	35.21
120	15	35.21

# 7.5.6 Minimum Requirements for inter-band NR DC

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

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

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

# 7.6 Maximum Receive Timing Difference

## 7.6.1 Introduction

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

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

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

# 7.6.2 Minimum Requirements for inter-band EN-DC

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

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

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note 1)	Maximum receive timing difference (µs)	
15	15	500	
15	30	250	
15	60	125	
15	120 <sup>Note2</sup>	62.5	
NOTE 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}.			

NOTE 2: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.6.3 and this Table 7.6.2-1 is also

applicable, the scenario with 120 kHz does not exit.

Table 7.6.2-2: Void

#### **Table 7.6.2-3 Void**

## 7.6.2.1 Minimum Requirements for inter-band synchronous EN-DC

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

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

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

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

## 7.6.3 Minimum Requirements for intra-band EN-DC

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

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

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

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

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) <sup>Note1</sup>	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	uency Range	Maximum receive timing difference (µs)
	FR1	3 <sup>1</sup>
	FR2	0.26
Note 1:	In the case of different SCS on different CCs, if the receive time difference exceeds the cyclic prefix length of that SCS, demodulation performance degradation is expected for the first symbol of the slot	

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 an 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{SCSss, SCSDATA}. NOTE 2: Void		

Table 7.6.5-2: Void

### 7.6.5.1 Minimum Requirements for inter-band synchronous NE-DC

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

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

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

Sub-carrier spacing	DL Sub-carrier	Maximum receive timing
of cell in MCG (kHz)	spacing of EUTRA	difference (µs)
, ,	cell in SCG (kHz)	" ,
	(Note1)	

15	15	
30	15	33
60	15	
120	15	

## 7.6.6 Minimum Requirements for inter-band NR DC

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

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

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

## 7.7 deriveSSB-IndexFromCell tolerance

## 7.7.1 Minimum requirements

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

## 7.8 Void

# 8 Signalling characteristics

# 8.1 Radio Link Monitoring

## 8.1.1 Introduction

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

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

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

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

The threshold  $Q_{out}$  is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLER<sub>out</sub>) 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<sub>in</sub>) 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<sub>out</sub>) and in-sync block error rate (BLER<sub>in</sub>) are determined from the network configuration via parameter *rlmInSyncOutOfSyncThreshold* signalled by higher layers. When UE is not configured with *rlmInSyncOutOfSyncThreshold* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 8.1.1-1 by default. All requirements in clause 8.1 are applicable for BLER Configuration #0 in Table 8.1.1-1.

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

Configuration	BLERout	BLERin
0	10%	2%

UE shall be able to monitor up to  $N_{RLM}$  RLM-RS resources of the same or different types in each corresponding carrier frequency range, depending on a maximum number  $L_{max}$  of SSBs per half frame according to TS 38.213 [3], where  $N_{RLM}$  is specified in Table 8.1.1-2 according TS 38.213 [3], 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<sub>RLM</sub>

Carrier frequency range of PCell/PSCell	$L_{ m max}$	Maximum number of RLM-RS resources, N <sub>RLM</sub>
FR1, ≤ 3 GHz <sup>Note</sup>	4	2
FR1, > 3 GHz <sup>Note</sup>	8	4
FR2	64	8
NOTE: For unpaired spectrum operation with Case C - 30 kHz SCS, 3GHz is replaced by 1.88GHz, as specified in		
clause 4.1 in TS 38 213 [3]		

# 8.1.2 Requirements for SSB based radio link monitoring

#### 8.1.2.1 Introduction

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

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

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

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

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

## 8.1.2.2 Minimum requirement

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

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

T<sub>Evaluate out SSB</sub> and T<sub>Evaluate in SSB</sub> 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,

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

## For FR2,

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

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

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

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$ , 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  $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP, T_{SMTCperiod})}},$  when the RLM-RS resource is partially overlapped with measurement gap and the

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

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$ , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ( $T_{SSB} = T_{SMTCperiod}$ ) and SMTC occasion is partially overlapped with measurement gap ( $T_{SMTCperiod} < MGRP$ )
- $P_{\text{sharing factor}} = 1$ , if the RLM-RS resource outside measurement gap is
  - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,
  - not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- P<sub>sharing factor</sub> = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present,  $T_{SMTCperiod}$  follows smtc2; Otherwise  $T_{SMTCperiod}$  follows smtc1.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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

Table 8.1.2.2-1: Evaluation period T<sub>Evaluate\_out\_SSB</sub> and T<sub>Evaluate\_in\_SSB</sub> for FR1

Configuration	T <sub>Evaluate_out_SSB</sub> (ms)	T <sub>Evaluate_in_SSB</sub> (ms)
no DRX	Max(200, Ceil(10 $\times$ P) $\times$ T <sub>SSB</sub> )	Max(100, Ceil(5 $\times$ P) $\times$ T <sub>SSB</sub> )
DRX cycle≤320ms	Max(200, Ceil(15 $\times$ P) $\times$	Max(100, Ceil(7.5 $\times$ P) $\times$ Max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))
	Max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))	
DRX cycle>320ms	Ceil(10 $\times$ P) $\times$ T <sub>DRX</sub>	Ceil(5 $\times$ P) $\times$ T <sub>DRX</sub>
NOTE: T <sub>SSB</sub> is the periodicity of the SSB configured for RLM. T <sub>DRX</sub> is the DRX cycle length.		

Table 8.1.2.2-2: Evaluation period T<sub>Evaluate\_out\_SSB</sub> and T<sub>Evaluate\_in\_SSB</sub> for FR2

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

#### 8.1.2.3 Measurement restrictions for SSB based RLM

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

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

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

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

## 8.1.3 Requirements for CSI-RS based radio link monitoring

#### 8.1.3.1 Introduction

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

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

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

Table 8.1.3.1-2: 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 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

## 8.1.3.2 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<sub>Evaluate out CSI-RS</sub> and T<sub>Evaluate in CSI-RS</sub> 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<sub>Evaluate\_out\_CSI-RS</sub> and T<sub>Evaluate\_in\_CSI-RS</sub> 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,

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

#### For FR2,

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

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

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

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

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

- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{CSI-RS}}{MGRP}}$ , when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ( $T_{\text{CSI-RS}} = T_{\text{SMTCperiod}}$ ) and SMTC occasion is partially overlapped with measurement gap ( $T_{\text{SMTCperiod}} < MGRP$ )
- $P_{\text{sharing factor}} = 1$ , if the RLM-RS resource outside measurement gap is
  - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,
  - not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$ , otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is present,  $T_{SMTCperiod}$  follows smtc2; Otherwise  $T_{SMTCperiod}$  follows smtc1.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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

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

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

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

Table 8.1.3.2-1: Evaluation period T<sub>Evaluate\_out\_CSI-RS</sub> and T<sub>Evaluate\_in\_CSI-RS</sub> for FR1

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

## 8.1.3.3 Measurement restrictions for CSI-RS based RLM

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

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

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

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

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

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

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

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

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

# 8.1.4 Minimum requirement at transitions

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

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

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for RLM present in the second configuration, the UE shall use an

evaluation period corresponding to the second configuration from the time of transition. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

# 8.1.5 Minimum requirement for UE turning off the transmitter

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

# 8.1.6 Minimum requirement for L1 indication

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

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

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

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

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

# 8.1.7 Scheduling availability of UE during radio link monitoring

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

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

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

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

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

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

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

## 8.1.7.3 Scheduling availability of UE performing radio link monitoring on FR2

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

- If the RLM-RS is CSI-RS which is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON,
  - There are no scheduling restrictions due to radio link monitoring based on the CSI-RS.
- Otherwise
  - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on RLM-RS symbols to be measured for radio link monitoring.

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

For FR2, if following conditions are met,

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

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

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

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

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

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

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.

# 8.2 Interruption

# 8.2.1 EN-DC Interruption

#### 8.2.1.1 Introduction

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

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

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

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

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

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

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

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

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

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

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

## 8.2.1.2 Requirements

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

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

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

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

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

#### 8.2.1.2.2 Interruptions at transitions from non-DRX to DRX

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

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

## 8.2.1.2.3 Interruptions at SCell addition/release

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

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

- the UE is allowed an interruption on any active serving cell in SCG:
- of up to X1 slot, if the active serving cell is not in the same band as the E-UTRA SCell being added or released, or
- of up to max{Y1 slot + T<sub>SMTC\_duration</sub>, 5ms} if the active serving cells are in the same band as the E-UTRA SCell being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell being added or released are available in the same slot, where T<sub>SMTC\_duration</sub> 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<sub>SMTC\_duration</sub> 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<sub>SMTC\_duration</sub> is
    - the longest SMTC duration among all above active serving cells in SCG and the SCell being added when one SCell is added. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC</sub> duration for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being added, T<sub>SMTC duration</sub> for the SCell being added is 0 ms;
    - 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 ots)	Interruption le	ngth Y1 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3
2	0.25		5	4	5
3	0.125		9	N/A	N/A

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

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and 4 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	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 the E-UTRA SCell 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 the E-UTRA SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell 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 active serving cell in SCG:
  - of up to X2 slot, if the active serving cell is not in the same band as the SCell being activated or deactivated, or
  - of up to Y2 slot + T<sub>SMTC\_duration</sub> if the active serving cells are in the same band as the SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot, where, T<sub>SMTC\_duration</sub> is
    - the longest SMTC duration among all above active serving cells in SCG and the SCell being activated when one SCell is activated. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC</sub> duration for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, T<sub>SMTC duration</sub> for the SCell being activated is 0ms;
    - 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		on length X2 ots)	Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125		5	N/A	N/A

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

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

# 8.2.1.2.5 Interruptions during measurements on SCC

#### 8.2.1.2.5.1 Interruptions during measurements on deactivated NR SCC

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

#### 8.2.1.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

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

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

Each interruption shall not exceed

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

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

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

## 8.2.1.2.6 Interruptions at UL carrier RRC reconfiguration

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

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

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

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

#### 8.2.1.2.7 Interruptions due to Active BWP switching Requirement

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

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

 μ
 NR Slot length (ms)
 Interruption length X (slots)

 0
 1
 1

 1
 0.5
 1

 2
 0.25
 3

 3
 0.125
 5

 Note1:
 void

Table 8.2.1.2.7-1: interruption length X

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]

# 8.2.2 SA: Interruptions with Standalone NR Carrier Aggregation

#### 8.2.2.1 Introduction

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

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

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

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell or SCell.

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

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 gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports per-FR gap, 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 the SCell 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 the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot.

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

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

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

	NR Slot length (ms)	Interruption length (slot)
$\mu$		
0	1	1 + T <sub>SMTC_duration</sub> * $N_{\text{slot}}^{\text{subframe},\mu}$
1	0.5	2 + T <sub>SMTC_duration</sub> * $N_{\rm slot}^{\rm subframe, \mu}$
2	0.25	$4 + T_{\text{SMTC\_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	8 + T <sub>SMTC_duration</sub> * $N_{\rm slot}^{\rm subframe, \mu}$

NOTE 1: T<sub>SMTC\_duration</sub> measured in subframes is

- the longest SMTC duration among all above active serving cells and the SCell being added when one SCell is added. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC duration</sub> for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, T<sub>SMTC duration</sub> for the SCell being added is 0ms; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.

NOTE 2:  $N_{\text{slot}}^{\text{subframe},\mu}$  is as defined in TS 38.211 [6].

## 8.2.2.2.2 Interruptions at SCell activation/deactivation

When an 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 8.2.2.2.1, if the active serving cell is not in the same band as the SCell 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 the SCell being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot.

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

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

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

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + Tsmtc_duration $N_{ m slot}^{ m subframe}$
1	0.5	1 + T <sub>SMTC_duration</sub> $*N_{ m slot}^{ m subframe}$ , $\mu$
2	0.25	$2 + T_{\text{SMTC\_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	4 + T <sub>SMTC_duration</sub> * $N_{\text{slot}}^{\text{subframe},\mu}$

NOTE 1: T<sub>SMTC\_duration</sub> measured in subframes is

### 8.2.2.2.3 Interruptions during measurements on deactivated SCC

Interruptions on PCell or activated SCell(s) 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.

- If the PCell or activated SCell(s) is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on PCell or activated SCell(s) immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.2-1.
- If the PCell or activated SCell(s) is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell or activated SCell(s) no earlier than X slots before T<sub>SMTC\_duration</sub> and no later than X slots after T<sub>SMTC\_duration</sub>, provided the cell specific reference signals from the active serving cells and the deactivated SCell are available in the same slot, where X and T<sub>SMTC\_duration</sub> are given by Table 8.2.2.2.3-1. The interruption shall not exceed requirements in Table 8.2.2.2.3-1.

Table 8.2.2.2.3-1: Interruption duration for measurement on deactivated SCell for intra-band CA

μ	NR Slot length (ms)	X (slots)	Interruption length (slots)
0	1	1	2 + T <sub>SMTC_duration</sub> * $N_{\rm slot}^{\rm subframe, \mu}$
1	0.5	1	$2 + T_{SMTC\_duration} * N_{slot}^{subframe, \mu}$

<sup>-</sup> the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC duration</sub> for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being activated,  $T_{SMTC duration}$  for the SCell being activated is

<sup>-</sup> the longest SMTC duration among all active serving NOTE 2:  $N_{\text{clot}}^{\text{subframe},\mu}$  is as defined in TS 38.211 [6].

2	0.25	2	$4 + T_{SMTC\_duration} * N_{slot}^{subframe, \mu}$		
3	0.125	4	8 + T <sub>SMTC_duration</sub> * $N_{\text{slot}}^{\text{subframe}, \mu}$		
NOTE 1: T <sub>SMTC_duration</sub> measured in subframes is the longest SMTC duration among all above active serving cells and the deactivated SCell to be measured:					
NOTE 2:	$N_{ m slot}^{ m subframe, \mu}$ is as de	fined in TS 38.211 [	[6].		

### 8.2.2.2.4 Interruptions at UL carrier RRC reconfiguration

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

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

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

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

#### 8.2.2.2.5 Interruptions due to Active BWP switching Requirement

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

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

μ	NR Slot length (ms)	Interruption length X (slots)
0	1	1
1	0.5	1
2	0.25	3
3	0.125	5
Note1:	void	

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

Parameters	Comment	
locationAndBandwidth	From TS 38.331 [2]	
nrofSRS-Ports	F10111 13 36.331 [2]	

#### 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<sub>measure\_SFTD1</sub> 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<sub>measure\_SFTD1</sub> 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<sub>measure\_SFTD1</sub> specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1.
  - the length of each interruption on FR1 and FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

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

SFTD	Serving	Neighbour cell SMTC periodicity					
configuration	cell µ	5ms	10ms	20ms	40ms	80ms	160ms
With RSRP	0						
report	1	8.4%	6.3%	8.4%	6.20/	F 20/	4.7%
	2	0.4%	0.3%	0.4%	6.3%	5.3%	4.7%
	3						

Without RSRP	0						
report	1	44 40/	0.60/	7.00/	6.00/	6.20/	6.00/
	2	11.4%	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 clause contains the requirements related to the interruptions on PCell and SCell, when

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

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

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

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

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

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

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

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

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

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

#### 8.2.3.2 Requirements

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

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

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

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

#### 8.2.3.2.3 Interruptions at PSCell/SCell addition/release

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

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

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

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

When one SCell in MCG is added or released:

- the UE is allowed an interruption on any activated serving cell in MCG:
  - of up to X1 slots, if the active serving cell is not in the same band as the SCell being added or released, or
  - of up to Y1 slots + T<sub>SMTC\_duration</sub> if the active serving cells are in the same band as the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot, where, T<sub>SMTC duration</sub> is
    - the longest SMTC duration among all above active serving cells in MCG and the SCell being added when one SCell is added. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC</sub> duration for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, T<sub>SMTC duration</sub> for the SCell being added is 0ms;
    - the longest SMTC duration among all above active serving cells in MCG when one SCell is released.

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

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

μ	NR Slot length	Interruption length X1 (slots)		Interruption length Y1 (slots)	
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3

	2	0.25	5	4	5
Ī	3	0.125	9	N/A	N/A

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

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and 4 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	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 slots, if the active serving cell is not in the same band as the E-UTRA SCell being activated or deactivated, or
  - of up to max{Y2 slots + T<sub>SMTC\_duration</sub>, 5ms} if the active serving cells are in the same band as the E-UTRA SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell being activated or deactivated are available in the same slot, where T<sub>SMTC\_duration</sub> 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 slots, if the active serving cell is not in the same band as the SCell being activated or deactivated, or
  - of up to Y2 slots + T<sub>SMTC\_duration</sub> if the active serving cells are in the same band as the SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot, where, T<sub>SMTC duration</sub> is
    - the longest SMTC duration among all above active serving cells in MCG and the SCell being activated when one SCell is activated, If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC</sub> duration for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, T<sub>SMTC</sub> duration for the SCell being activated is 0ms;
    - 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

11	Interruption length X	2 Interruption length Y2 (slots)
μ	(slots)	

	NR Slot length (ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125	5		N/A	N/A

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

μ	NR Slot length (ms) of victim cell	Interruption leng	gth X2 (slots)	Interruption length Y2 (slots)		
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 slots, if the PCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slots + 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	Interruption length X3 (slots)		Interruption le	ength Y3 (slot)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3

3	0.125	5	N/A	N/A

#### 8.2.3.2.6 Interruptions at UL carrier RRC reconfiguration

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

When an UL carrier or supplementary UL carrier is configured or deconfigured, an interruption of up to X4 slot as specified in Table 8.2.3.2.6-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [2] on PCell, all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell, all activated E-UTRA SCells, E-UTRA PSCell and all activated SCells within the same FR as the configured or de-configured UL.

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

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

#### 8.2.3.2.7 Interruptions due to Active BWP switching Requirement

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

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

# 8.2.4 NR-DC: Interruptions

## 8.2.4.1 Introduction

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

SCells are configured, de-configured, activated or deactivated or,

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

measurements on SCC with deactivated SCell in NR SCG, or

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

transitions from non-DRX to DRX.

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

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 gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports 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 one or more SCells 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 the SCell 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 the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot.

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

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

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

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + $T_{SMTC\_duration} * N_{slot}^{subframe, \mu}$
1	0.5	$2 + T_{SMTC\_duration} * N_{slot}^{Subframe, \mu}$
2	0.25	$4 + T_{\text{SMTC\_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	8 + T <sub>SMTC_duration</sub> * $N_{slot}^{subframe, \mu}$

NOTE 1: T<sub>SMTC\_duration</sub> measured in subframes is

- the longest SMTC duration among all above activeserving cells and the SCell being added when one SCell is added. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T<sub>SMTC duration</sub> for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, T<sub>SMTC duration</sub> for the SCell being added is 0ms; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.

NOTE 2:  $N_{\rm slot}^{\rm subframe, \mu}$  is as defined in TS 38.211 [6].

## 8.2.4.2.2 Interruptions at SCell activation/deactivation

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

- an interruption on any active serving cell:
  - of up to the duration shown in table 8.2.4.2.2-1, if the active serving cell is not in the same band as the SCell 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 the SCell being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCell 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 le	ngth (slots)	
0	1	1		
1	0.5	1		
2	0.25	Both aggressor cell and 2 victim cell are on FR2		
		Either aggressor cell or 3 victim cell is on FR1		
3	0.125	Aggressor cell is on FR2	4	
		Aggressor cell is on FR1	5	

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

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + T <sub>SMTC_duration</sub> * $N_{\rm slot}^{\rm subframe, \mu}$
1	0.5	1 + $T_{SMTC\_duration} * N_{slot}^{subframe, \mu}$
2	0.25	2 + T <sub>SMTC_duration</sub> * N <sub>slot</sub> <sup>subframe,μ</sup>
3	0.125	$4 + T_{\text{SMTC\_duration}} * N_{\text{slot}}^{\text{Subframe}, \mu}$

NOTE 1: T<sub>SMTC\_duration</sub> measured in subframes is

- the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and  $T_{\text{SMTC duration}}$  for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being activated,  $T_{\text{SMTC duration}}$  for the SCell being activated is 0ms;
- the longest SMTC duration among all active serving cells in the same band when one SCell is deactivated.

NOTE 2:  $N_{\rm slot}^{\rm subframe, \mu}$  is as defined in TS 38.211 [6].

#### 8.2.4.2.3 Interruptions during measurements on SCC

Interruption on PCell, PSCell and other activated 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 SpCell.

## 8.2.4.2.4 Interruptions at UL carrier RRC reconfiguration

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

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.4.2.4-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [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 (slots)
0	1	1

1	0.5	2
2	0.25	4
3	0.125	8

## 8.2.4.2.5 Interruptions due to Active BWP switching Requirement

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

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

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

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

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

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

μ	NR Slot length (ms)	Interruptio (slo	
		Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25		3
3	0.125	5	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 slots 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 slots as defined in table 8.2.4.2.6-1.

# 8.3 SCell Activation and Deactivation Delay

#### 8.3.1 Introduction

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

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

# 8.3.2 SCell Activation Delay Requirement for Deactivated SCell

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

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

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

NR slot length

T<sub>HARO</sub> (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

T<sub>activation\_time</sub> is the SCell activation delay in millisecond.

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

- $T_{FirstSSB}$ + 5ms, if the measurement period of the SCell being activated is equal to or smaller than 2400ms.
- T<sub>FirstSSB\_MAX</sub> + T<sub>rs</sub> + 5ms, if the measurement period of the SCell being activated is larger than 2400ms.

If the SCell being activated belongs to FR1 and if there is at least one active serving cell contiguous to the SCell on that FR1 band, if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration for the target SCell, T<sub>activation\_time</sub> is 3 ms for UE supporting *scellWithoutSSB*, provided

- The RTD between the target SCell and the contiguous active serving cell is within within ±260ns, and
- The difference of the reception power with the contiguous active serving cell is <= 6dB, and
- The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) of the SCell being activated is (are) further QCL-TypeC with SSB(s) of any active serving cell that is contiguous to the SCell being activated on that FR1 band.

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

-  $T_{FirstSSB\ MAX} + T_{SMTC\ MAX} + 2*T_{rs} + 5ms$ 

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, and
- The parameter ssb-PositionsInBurst is same for the serving cell(s) and the Scell, and
- SSB is in the same half-frame on the SCell and the contiguous FR2 active serving cell.

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 supporting *scellWithoutSSB* is not provided with any SMTC for the target SCell, T<sub>activation\_time</sub> is 3 ms, provided

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

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

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

 3ms + max(T<sub>uncertainty\_MAC</sub> + T<sub>FineTiming</sub> + 2ms, T<sub>uncertainty\_SP</sub>), where T<sub>uncertainty\_MAC</sub>=0 and T<sub>uncertainty\_SP</sub>=0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time. If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation\_time is:

-  $max(T_{uncertainty\_MAC} + 5ms + T_{FineTiming}, T_{uncertainty\_RRC} + T_{RRC\_delay} - T_{HARQ})$ , where  $T_{uncertainty\_MAC} = 0$  if UE receives the SCell activation command and TCI state activation commands at the same time.

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

- 6ms +  $T_{FirstSSB\_MAX}$  + 15\* $T_{SMTC\_MAX}$  + 8\* $T_{rs}$  +  $T_{L1-RSRP, measure}$  +  $T_{L1-RSRP, report}$  +  $T_{HARQ}$  + max( $T_{uncertainty\_MAC}$  +  $T_{Fine}$ Timing + 2ms,  $T_{uncertainty\_SP}$ ).

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

 $-3ms + T_{FirstSSB\_MAX} + 15*T_{SMTC\_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + max \{ (T_{HARQ} + T_{uncertainty\_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty\_RRC} + T_{RRC\_delay}) \}.$ 

where,

#### T<sub>SMTC MAX</sub>:

- In FR1, in case of intra-band SCell activation, T<sub>SMTC\_MAX</sub> 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<sub>SMTC\_MAX</sub> is the SMTC periodicity of SCell being activated.
- In FR2, T<sub>SMTC\_MAX</sub> 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<sub>SMTC\_MAX</sub> 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 measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. 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 are no requirements if the SSB transmission periodicity is not 5ms.

 $T_{FirstSSB}$ : is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot  $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ .

 $T_{FirstSSB\_MAX}$ : Is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot  $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, leng \, th}$ , further fulfilling:

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

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

 $T_{L1\text{-RSRP, measure}}$  is L1-RSRP measurement delay  $T_{L1\text{-RSRP\_Measurement\_Period\_CSI-RS}}$  ms or  $T_{L1\text{-RSRP\_Measurement\_Period\_CSI-RS}}$  based on applicability as defined in clause 9.5 assuming M=1 and  $T_{Report}$ =0.

T<sub>L1-RSRP, report</sub> 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) relative to

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

T<sub>uncertainty\_SP</sub> is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting relative to

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

T<sub>uncertainty\_RRC</sub> 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<sub>RRC delay</sub> is the RRC procedure delay as specified in TS 38.331 [2].

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

When absoluteFrequencySSB is not configured in DownlinkConfigCommon for target SCell but SMTC for target SCell is configured, no requirement would be applied.

T<sub>CSI\_reporting</sub> 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.

The requirements for FR1 unknown SCell activation specified in this clause apply when one of the following conditions is met

- 'ssb-PositionInBurst' indicates only one SSB is being actually transmitted, or
- 'ssb-PositionInBurst' indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation.

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

- During the period equal to 4s for UE supporting power class 1 and 3s for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):
  - the UE has sent a valid L3-RSRP measurement report with SSB index, and
  - 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<sub>SMTC\_Scell</sub> follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. T<sub>SMTC\_MAX</sub> 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 starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot  $n+1+\frac{T_{HARQ}}{NR\,slot\,\,length}$  and not occur after slot  $n+1+\frac{T_{HARQ}+3ms+T_X}{NR\,slot\,\,length}$ , where NR slot length is with respect to the numerology used in the SCell being activated, and  $T_X$  is:

- 0, if T<sub>activation time</sub> is 3ms
- T<sub>FirstSSB</sub>, for any scenario where T<sub>activation\_time</sub> includes T<sub>FirstSSB</sub>;
- T<sub>FirstSSB\_MAX</sub>, for any scenario where T<sub>activation\_time</sub> includes T<sub>FirstSSB\_MAX</sub>;
- Tuncertainty\_MAC + TrineTiming, for any scenario where Tactivation\_time includes only TrineTiming- and no TrirstSSB\_MAX.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

The requirements in this clause and requirements on interruption due to SCell activation in clause 8.2 apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of 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 the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

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

# 8.3.3 SCell Deactivation Delay Requirement for Activated SCell

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

Upon receiving SCell deactivation command in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot  $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ . The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot  $n+1+\frac{T_{HARQ}}{NR \, slot \, length}$  and not occur after slot  $n+1+\frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , where NR slot length is with respect to the numerology used in the SCell being deactivated.

Upon expiry of the *sCellDeactivationTimer* in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot  $n + \frac{3ms}{NR \, slot \, length}$ . The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1 and not occur after slot n+1+  $\frac{3ms}{NR \, slot \, length}$ , where NR slot length is with respect to the numerology used in the SCell being deactivated.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

# 8.4 UE UL carrier RRC reconfiguration delay

## 8.4.1 Introduction

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

# 8.4.2 UE UL carrier configuration delay requirement

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

#### Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T<sub>UL\_carrier\_config</sub> equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it 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 slot n.

#### Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T<sub>UL\_carrier\_deconfig</sub> equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it 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  $Q_0$  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  $\overline{Q}_0$ .

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  $Q_{out\_LR}$  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<sub>out</sub> = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection,  $Q_{out\_LR\_SSB}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.2.1-1. For CSI-RS based beam failure detection,  $Q_{out\_LR\_CSI-RS}$  is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.3.1-1.

Upon request the UE shall deliver configuration indexes from the set  $\overline{Q}_1$  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 an SSB. The UE applies the  $Q_{in\_LR}$  threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer

parameter powerControlOffsetSS. The RS resource configurations in the set  $Q_1$  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 clause apply for each SSB resource in the set  $Q_0$  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.

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

6

Normal

Distributed

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

# 8.5.2.2 Minimum requirement

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

The value of T<sub>Evaluate BFD SSB</sub> is defined in Table 8.5.2.2-1 for FR1.

REG bundle size

Mapping from REG to CCE

CP length

The value of  $T_{\text{Evaluate\_BFD\_SSB}}$  is defined in Table 8.5.2.2-2 for FR2 with scaling factor N=8

For FR1,

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

For FR2,

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

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

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

 $P_{\text{sharing factor}} = 1$ , if the BFD-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and:
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$ , otherwise.

where,

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.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, given the SMTC offset of all CCs in FR2 provided the same offset.

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

Table 8.5.2.2-1: Evaluation period T<sub>Evaluate\_BFD\_SSB</sub> for FR1

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

Table 8.5.2.2-2: Evaluation period T<sub>Evaluate\_BFD\_SSB</sub> for FR2

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

#### 8.5.2.3 Measurement restriction for SSB based beam failure detection

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

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

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

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

# 8.5.3 Requirements for CSI-RS based beam failure detection

#### 8.5.3.1 Introduction

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

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

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

Mapping from REG to CCE	Distributed

## 8.5.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in set  $\overline{q}_0$  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<sub>Evaluate\_BFD\_CSI-RS</sub> is defined in Table 8.5.3.2-2 for FR2 with N=1. The requirements of T<sub>Evaluate\_BFD\_CSI-RS</sub> 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,

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

#### For FR2,

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

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

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

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

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

- $P_{\text{sharing factor}} = 1$ , if the BFD-RS resource outside measurement gap is
  - not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;
  - not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured,
- $P_{\text{sharing factor}} = 3$ , otherwise.

where.

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.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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

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

The values of M<sub>BFD</sub> 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 and over the bandwidth  $\geq 24$  PRBs.

Table 8.5.3.2-1: Evaluation period T<sub>Evaluate\_BFD\_CSI-RS</sub> for FR1

Configuration	T <sub>Evaluate_BFD_CSI-RS</sub> (ms)	
no DRX	$Max(50, Ceil(M_{BFD} \times P) \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	$Max(50, Ceil(1.5 \times M_{BFD} \times P) \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P) \times T_{DRX}$	
Note: T <sub>CSI-RS</sub> is the periodicity of CSI-RS resource in the set $\overline{q}_0$ . T <sub>DRX</sub> is the		
DRX cycle length.		

Table 8.5.3.2-2: Evaluation period T<sub>Evaluate\_BFD\_CSI-RS</sub> for FR2

Configuration	T <sub>Evaluate_BFD_CSI-RS</sub> (ms)	
no DRX	$Max(50, Ceil(M_{BFD} \times P \times N) \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	Max(50, Ceil(1.5 $\times$ M <sub>BFD</sub> $\times$ P $\times$ N) $\times$ Max(T <sub>DRX</sub> , T <sub>CSI-RS</sub> ))	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P \times N) \times T_{DRX}$	
Note: $T_{\text{CSI-RS}}$ is the periodicity of CSI-RS resource in the set $\overline{q}_0$ . $T_{\text{DRX}}$ is the		
DRX cycle length.		

#### 8.5.3.3 Measurement restrictions for CSI-RS beam failure detection

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

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

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

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

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

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

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

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

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

# 8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the RS resources in set  $\overline{q}_0$  is worse than  $Q_{\text{out\_LR}}$ , layer 1 of the UE shall send a beam failure instance indication to the higher layers.

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

When DRX is not used,  $T_{Indication\_interval\_BFD}$  is max(2ms,  $T_{SSB-RS,M}$ ) or max(2ms,  $T_{CSI-RS,M}$ ), where  $T_{SSB-RS,M}$  and  $T_{CSI-RS,M}$  is the shortest periodicity of all RS resources in set  $\overline{q}_0$  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, for SSB based link quality measurement,

- $T_{Indication\_interval\_BFD} = Max(1.5 \times DRX\_cycle\_length, 1.5 \times T_{SSB-RS,M})$ , if DRX\_cycle\_length  $\leq 320$ ms,
- $\quad T_{Indication\_interval\_BFD} = DRX\_cycle\_length, if \ DRX\_cycle\_length > 320ms.$

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

- T<sub>Indication interval BFD</sub> = Max(1.5 × DRX\_cycle\_length, 1.5 × T<sub>CSL-RS.M</sub>), if DRX\_cycle\_length ≤ 320ms,
- T<sub>Indication\_interval\_BFD</sub> = DRX\_cycle\_length, if DRX\_cycle\_length > 320ms.

# 8.5.5 Requirements for SSB based candidate beam detection

#### 8.5.5.1 Introduction

The requirements in this clause apply for each SSB resource in the set  $\bar{q}_1$  configured for a serving cell, provided that the SSBs configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in 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  $T_{\text{Evaluate\_CBD\_SSB}}$  ms period becomes better than the threshold  $Q_{\text{in\_LR}}$  provided SSB\_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.

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

The value of  $T_{Evaluate\_CBD\_SSB}$  is defined in Table 8.5.5.2-1 for FR1.

The value of T<sub>Evaluate CBD SSB</sub> is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8.

where.

For FR1.

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

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$ , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{SSB} < T_{SMTCperiod}$ ).
- P is  $P_{sharing\ factor}$ , when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period ( $T_{SSB} = T_{SMTCperiod}$ ).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$ , 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  $T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$ , when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ( $T_{SSB} < T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and  $T_{SMTCperiod} = MGRP$  and  $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP, T_{SMTCperiod})}}$ , 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
- $P = \frac{P_{Sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$ , 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 ( $T_{SMTCperiod} < MGRP$ )

- $P_{\text{sharing factor}} = 1$ , if the candidate beam detection RS outside measurement gap is
  - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
    consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
    symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
    is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
    carrier, and;
  - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured
- $P_{\text{sharing factor}} = 3$ , otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is present,  $T_{SMTCperiod}$  follows smtc2; Otherwise  $T_{SMTCperiod}$  follows smtc1.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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

Table 8.5.5.2-1: Evaluation period T<sub>Evaluate\_CBD\_SSB</sub> for FR1

Configuration		T <sub>Evaluate_CBD_SSB</sub> (ms)
non-DRX, DRX cycle		$Max(25, Ceil(3 \times P) \times T_{SSB})$
<b>\leq</b>	≨ 320ms	
DRX cycle > 320ms		$Ceil(3 \times P) \times T_{DRX}$
Note: T <sub>SSB</sub> is the pe		priodicity of SSB in the set $\overline{q}_{\scriptscriptstyle  m I}$ . ${\sf T}_{\sf DRX}$ is the DRX cycle
length.		

Table 8.5.5.2-2: Evaluation period T<sub>Evaluate\_CBD\_SSB</sub> for FR2

Configuration		T <sub>Evaluate_CBD_SSB</sub> (ms)
non-DRX, DRX cycle		$Max(25, Ceil(3 \times P \times N) \times T_{SSB})$
≤ 320ms		
DRX cycle > 320ms		$Ceil(3 \times P \times N) \times T_{DRX}$
Note: T <sub>SSB</sub> is the pe		priodicity of SSB in the set $\overline{q}_{\scriptscriptstyle  m l}$ . $$ T <sub>DRX</sub> is the DRX cycle
length.		

### 8.5.5.3 Measurement restriction for SSB based candidate beam detection

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

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

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

# 8.5.6 Requirements for CSI-RS based candidate beam detection

#### 8.5.6.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set  $\overline{q}_1$  configured for a serving cell, provided that the CSI-RS resources configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.6.2.

## 8.5.6.2 Minimum requirement

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

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

The value of  $T_{Evaluate\_CBD\_CSI-RS}$  is defined in Table 8.5.6.2-1 for FR1.

The value of T<sub>Evaluate CBD CSI-RS</sub> is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8.

#### For FR1,

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

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
- $T_{SMTCperiod} = MGRP$  and  $T_{CSI\text{-}RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{\text{CSI-RS}}}{MGRP}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{\text{CSI-RS}} < T_{\text{SMTCperiod}}$) and SMTC occasion is not overlapped with measurement gap and $T_{\text{SMTCperiod}} = MGRP$ and $T_{\text{CSI-RS}} = 0.5 \times T_{\text{SMTCperiod}}$$

- $P = \frac{1}{1 \frac{T_{\text{CSI-RS}}}{Min(MGRP,T_{SMTCperiod})}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$ 
  - 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
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$ , 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 ( $T_{SMTCperiod} < MGRP$ )
- P<sub>sharing factor</sub> = 1, if the candidate beam detection RS outside measurement gap is
  - not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;
  - not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$ , otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present,  $T_{SMTCperiod}$  follows smtc2; Otherwise  $T_{SMTCperiod}$  follows smtc1.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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

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

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

The values of M<sub>CBD</sub> used in Table 8.5.6.2-1 and Table 8.5.6.2-2 are defined as

-  $M_{CBD} = 3$ , if the CSI-RS resource configured in the set  $\bar{q}_1$  is transmitted with Density = 3 and over the bandwidth  $\geq 24$  PRBs.

Table 8.5.6.2-1: Evaluation period T<sub>Evaluate\_CBD\_CSI-RS</sub> for FR1

Configuration		TevaluateC_CBD_CSI-RS (ms)	
non-DRX, DRX cycle		Max(25, Ceil(M <sub>CBD</sub> $\times$ P) $\times$ T <sub>CSI-RS</sub> )	
≤ 320ms			
DRX cycle > 320ms		$Ceil(M_{CBD} \times P) \times T_{DRX}$	
Note:	T <sub>CSI-RS</sub> is the	$T_{CSI-RS}$ is the periodicity of CSI-RS resource in the set $\ \overline{q}_{l}$ . $T_{DRX}$ is the	
DRX cycle length.			

Table 8.5.6.2-2: Evaluation period T<sub>Evaluate\_CBD\_CSI-RS</sub> for FR2

Configuration		T <sub>Evaluate_CBD_CSI-RS</sub> (ms)
non-DRX, DRX cycle		$Max(25, Ceil(M_{CBD} \times P \times N) \times T_{CSI-RS})$
≤ 320ms		
DRX cycle > 320ms		$Ceil(M_{CBD} \times P \times N) \times T_{DRX}$
Note:	T <sub>CSI-RS</sub> is the periodicity of CSI-RS resource in the set $\ \overline{q}_{\rm l}$ . T <sub>DRX</sub> is the	
DRX cycle length.		

### 8.5.6.3 Measurement restriction for CSI-RS based candidate beam detection

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

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

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

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

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

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

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

## 8.5.7 Scheduling availability of UE during beam failure detection

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

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

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

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

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

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

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

### 8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON
  - There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.
- Otherwise
  - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection.

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

For FR2, if following conditions are met,

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

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

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

## 8.5.8 Scheduling availability of UE during candidate beam detection

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

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

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

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

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

support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as link recovery detection resource.

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

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

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

The following scheduling restriction applies due to candidate beam detection

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

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

For FR2, if following conditions are met,

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

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

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

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.

## 8.5.9 Minimum requirement at transitions for beam failure detection

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each BFD-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 BFD-RS resource.

When the UE transitions from a first configuration of BFD resources to a second configuration of BFD resources that is different from the first configuration, for each BFD 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 BFD resource present in the second configuration.

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 BFD present in the second configuration, the UE shall use an evaluation period corresponding to the second configuration from the time of transition.

## 8.6 Active BWP switch delay

### 8.6.1 Introduction

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

## 8.6.2 DCI and timer based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with more than one BWP configurations configured.

For DCI based BWP switch, if the serving cell where UE receives DCI for BWP switch request is different from the serving cell on which BWP switch occurs, the UE is not required to follow the requirements specified in this clause.

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of  $T_{BWPswitchDelay}$  which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals until the first DL or UL slot occurs right after a time duration of  $T_{BWPswitchDelay}$  which starts from the beginning of DL slot n except DCI triggering BWP switch on the cell where DCI-based BWP switch occurs. The UE is not required to follow the requirements defined in this clause when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where slot n is the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer *bwp-InactivityTimer* [2] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T<sub>BWPswitchDelay</sub> which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals during time duration  $T_{BWPswitchDelay}$  after *bwp-InactivityTimer* [2] expires on the cell where timer-based BWP switch occurs.

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration T<sub>BWPswitchDelay</sub> defined in Table 8.6.2-1.

Table 8.6.2-1: BWP switch delay

ш	NR Slot		y T <sub>BWPswitchDelay</sub> (slots)	
μ	length (ms)	Type 1 <sup>Note 1</sup>	Type 2 <sup>Note 1</sup>	
0	1	1	3	
1	0.5	2	5	
2	0.25	3	9	
3	0.125	6	18	

Note 1: Depends on UE capability.

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

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

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

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

## 8.6.3 RRC based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured, with

- Active BWP switch or parameter change of its active BWPs for SpCell
- Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCell

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

DL slot n is the last slot overlapping with the PDSCH containing the RRC command, and

NR Slot length is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch if the BWP switch involves changing of SCS.

 $T_{RRCprocessing\,Delay}$  is the length of the RRC procedure delay in ms as defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the length of the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [2], and

 $T_{BWPswitchDelayRRC} = 6ms$  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. When  $T_{HARQ} > T_{RRCprocessingDelay}$  a longer switching delay is allowed. Where  $T_{HARQ}$  is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

### 8.7 Void

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

### 8.8.1 Introduction

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

## 8.8.2 E-UTRAN PSCell Addition Delay Requirement

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

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

#### Where:

 $T_{config\_EUTRAN-PSCell} = T_{RRC\_delay} + T_{activation\_time} + 50ms + T_{E-UTRAN-PSCell\_DU}$ 

T<sub>RRC delay</sub> is the RRC procedure delay as specified in TS 38.331 [2].

 $T_{activation\_time}$  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.

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

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

- During the last 5 seconds before the reception of the E-UTRAN PSCell configuration command:
  - the UE has sent a valid measurement report for the E-UTRAN PSCell being configured and
  - the E-UTRAN PSCell being configured remains detectable according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15],
- E-UTRAN PSCell being configured also remains detectable during the E-UTRAN PSCell configuration delay T<sub>config\_EUTRAN-PSCell</sub> according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15].

otherwise it is unknown.

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

## 8.8.3 E-UTRAN PSCell Release Delay Requirement

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

Upon receiving E-UTRAN PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe n+  $T_{RRC\_delay}$ :

Where

T<sub>RRC\_delay</sub> 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].

# 8.9 NR-DC: PSCell Addition and Release Delay

### 8.9.1 Introduction

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

## 8.9.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in slot  $n + \frac{T_{config\_PSCell}}{NR \, slot \, length}$ .

where:

$$T_{config\_PSCell} = T_{RRC\_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell\_DU} + 2 \ ms$$

T<sub>RRC delay</sub> is the RRC procedure delay as specified in TS 38.331 [2].

T<sub>processing</sub> is the SW processing time needed by UE, including RF warm up period. T<sub>processing</sub> = 40 ms.

 $T_{search}$  is the time for AGC settling and PSS/SSS detection. If the target cell is known,  $T_{search} = 0$  ms. If the target cell is unknown and the target cell  $\hat{E}_s/Iot \ge -2dB$ ,  $T_{search} = 24*$  Trs ms.

 $T_{\Delta}$  is time for fine time tracking and acquiring full timing information of the target cell.  $T_{\Delta} = 1*Trs$  ms for a known or unknown PSCell.

 $T_{PSCell\_DU}$  is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell.  $T_{PSCell\_DU}$  is up to the summation of SSB to PRACH occasion associated period 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 clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

In FR1 and FR2, the PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the PSCell configuration command:

- the UE has sent a valid measurement report for the PSCell being configured and
- One of the SSBs measured from the PSCell being configured remains detectable according to the cell identification conditions specified in clause 9.3.
- One of the SSBs measured from PSCell being configured also remains detectable during the PSCell configuration delay T<sub>config\_PSCell</sub> according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

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

## 8.9.3 PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and one PSCell.

Upon receiving PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in slot  $n + \frac{T_{RRC\_delay}}{NR \ slot \ length}$ :

where

T<sub>RRC delay</sub> is the RRC procedure delay as specified in TS 38.331 [2].

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

# 8.10 Active TCI state switching delay

### 8.10.1 Introduction

The requirements in this clause apply for a UE configured with one or more TCI state configurations on serving cell in MR-DC or standalone NR. UE shall complete the switch of active TCI state within the delay defined in this clause.

#### 8.10.2 Known conditions for TCI state

The TCI state is known if the following conditions are met:

- During the period from the last transmission of the RS resource used for the L1-RSRP measurement reporting for the target TCI state to the completion of active TCI state switch, where the RS resource for L1-RSRP measurement is the RS in target TCI state or QCLed to the target TCI state
  - TCI state switch command is received within 1280 ms upon the last transmission of the RS resource for beam reporting or measurement
  - The UE has sent at least 1 L1-RSRP report for the target TCI state before the TCI state switch command
  - The TCI state remain detectable during the TCI state switching period
  - The SSB associated with the TCI state remain detectable during the TCI switching period
    - SNR of the TCI state  $\geq$  -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 in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+  $T_{HARQ}$  +  $3N_{slot}^{subframe,\mu}$ +  $TO_k*(T_{first-SSB} + T_{SSB-proc})$  / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+  $T_{HARQ}$  +  $3N_{slot}^{subframe,\mu}$ .

Where T<sub>HARO</sub> is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3];

T<sub>first-SSB</sub> is time to first SSB transmission after MAC CE command is decoded by the UE;

 $T_{SSB-proc} = 2 \text{ ms};$ 

 $TO_k = 1$  if target TCI state is not in the active TCI state list for PDSCH, 0 otherwise.

If the target TCI state is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+  $T_{HARQ}$  +3 $N_{slot}^{subframe,\mu}$  +  $T_{L1-RSRP}$ +TO<sub>uk</sub>\*( $T_{first-SSB}$ +  $T_{SSB-proc}$ ) / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+  $T_{HARQ}$  + 3 $N_{slot}^{subframe,\mu}$ .

#### Where

T<sub>L1-RSRP</sub> = 0 in FR1 or when the TCI state switching not involving QCL-TypeD in FR2. Otherwise,

 $T_{\text{L1-RSRP}}$  is the time for Rx beam refinement in FR2, defined as

- T<sub>L1-RSRP\_Measurement\_Period\_SSB</sub> for SSB as specified in clause 9.5.4.1,
  - with the assumption of M=1
  - with  $T_{Report} = 0$
- T<sub>L1-RSRP\_Measurement\_Period\_CSI-RS</sub> for CSI-RS as specified in clause 9.5.4.2
  - configured with higher layer parameter repetition set to ON
  - with the assumption of M=1 for periodic CSI-RS
  - for aperiodic CSI-RS if number of resources in resource set at least equal to MaxNumberRxBeam
  - with  $T_{Report} = 0$
- $TO_{uk} = 1$  for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement when TCI state switching involves QCL-TypeD
- $TO_{uk} = 1$  when TCI state switching involves other QCL types only

- T<sub>first-SSB</sub> is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- T<sub>first-SSB</sub> is time to first SSB transmission after MAC CE command is decoded by the UE for other QCL types;
  - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

## 8.10.4 DCI based TCI state switch delay

If the target TCI state is known, when a UE is configured with the higher layer parameter *tci-PresentInDCI* which is set as 'enabled' for the CORESET scheduling PDSCH at slot n, UE shall be able to receive PDSCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+*timeDurationForQCL*, where, *timeDurationForQCL* is the time required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [26], the value of *timeDurationForQCL* is defined in TS 38.331 [2].

The known condition for TCI state defined in clause 8.10.2 is applied.

## 8.10.5 RRC based TCI state switch delay

If the target TCI state is known, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot  $n+(T_{RRC\_processing}+TO_k*(T_{first-SSB}+T_{SSB-proc})) / NR slot length,$  The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.

#### Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T<sub>RRC\_processing</sub> is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T<sub>first-SSB</sub> is time to first SSB transmission after RRC processing by the UE; The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state.
- $T_{SSB-proc}$  and  $TO_k$  are defined in clause 8.10.3.

If the target TCI state is unknown, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot  $n+(T_{RRC\_processing} + T_{L1-RSRP} + TO_{uk}*(T_{first-SSB} + T_{SSB-proc})) / NR slot length, The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.$ 

#### Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T<sub>RRC\_processing</sub> is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T<sub>first-SSB</sub> is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- T<sub>first-SSB</sub> is time to first SSB transmission after RRC processing time at the UE for other QCL types;
  - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state
- T<sub>L1-RSRP</sub>, TO<sub>uk</sub> and T<sub>SSB-proc</sub> are defined in clause 8.10.3.

The requirements for RRC based TCI state switch delay apply when only 1 TCI state is configured in RRC TCI state list. When  $T_{HARQ} > T_{RRC\_processing}$  a longer switching delay is allowed. Where  $T_{HARQ}$  is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

## 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 at the first slot that is after n+  $T_{HARQ}$  +3 $N_{slot}^{subframe,\mu}$  +TO<sub>k</sub>\*( $T_{first-SSB}$  +  $T_{SSB-proc}$ ) / NR slot length. Where  $T_{HARQ}$ ,  $T_{first-SSB}$ ,  $T_{SSB-proc}$  and  $TO_k$  are defined in clause 8.10.3.

# 8.11 PSCell Change

This clause defines requirements for the delay within which the UE shall be able to change PSCell to other cell in ENDC or NR-DC. The requirements in this clause are applicable to EN-DC and NR-DC.

The UE shall be capable of transmitting PRACH preamble towards the target PSCell no later than specified in clause 8.9.2 for the case of NR-DC and in TS 36.133 clause 7.31.2 for the case of EN-DC,, where the following values for slot n,  $T_{processing}$  and  $T_{RRC\_delay}$  shall override the existing ones:

- Slot n is the last slot overlapping with the PDSCH containing PSCell change,
- $T_{processing} = 20$  ms when source and target cells are in the same FR,
- $T_{processing} = 40$  ms when source and target cells are in different FRs.
- T<sub>RRC\_delay</sub> is the RRC procedure delay as specified in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC procedure delay as specified in TS 38.331 [2].

If the SMTC periodicity of the target cell is not provided within the PSCell change message, and measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, T<sub>rs</sub> is the periodicity of one of the SMTC which is up to UE implementation.

The target PSCell is known if it has been meeting the conditions in clause 8.9.2 for the case of NR-DC and in TS36.133 clause 7.31.2 for the case of EN-DC.

The interruption on PCell and other serving cells specified in TS36.133 clause 7.32.2.1 for EN-DC and in TS38.133 clause 8.2.4.2.1 for NR-DC is allowed only during the RRC reconfiguration procedure [2].

# 9 Measurement Procedure

# 9.1 General measurement requirement

### 9.1.1 Introduction

This clause contains general requirements on the UE regarding measurement reporting in RRC\_CONNECTED state. The requirements are split in intra-frequency, inter-frequency, inter-RAT E-UTRAN FDD, inter-RAT E-UTRAN TDD, and L1-RSRP measurements requirements. These measurements may be used by the NG-RAN. The measurement quantities are defined in TS38.215 [4], the measurement model is defined in TS38.300 [10], TS37.340 [17] and measurement accuracies are specified in clause 10. Control of measurement reporting is specified in TS 38.331 [2].

In the requirements of clause 9, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;

- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2, respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

## 9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers.

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide either per-FR measurement gap patterns for frequency range where UE requires per-FR measurement gap for concurrent monitoring of all frequency layers of each frequency range independently, or a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers of all frequency ranges.

During the per-UE measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [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 TS38.321 [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 TS38.321 [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 TS38.321 [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 TS38.321 [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 TS38.321 [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 TS38.321 [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

**Table 9.1.2-1: Gap Pattern Configurations** 

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)
0	6	40
1	6	80
2	3	40
3	3	80
4	6	20
5	6	160
6	4	20
7	4	40
8	4	80
9	4	160
10	3	20
11	3	160
12	5.5	20
13	5.5	40
14	5.5	80
15	5.5	160
16	3.5	20
17	3.5	40
18	3.5	80
19	3.5	160
20	1.5	20
21	1.5	40
22	1.5	80
23	1.5	160

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
	E-UTRA + FR1, or	non-NR RAT Note1,2	0,1,2,3
Per-UE	E-UTRA + FR2, or	FR1 and/or FR2	0-11
measurement	E-UTRA + FR1 +	non-NR RAT <sup>Note1,2</sup>	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2	and FR1 and/or FR2	
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2	0,1,2,3
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR2 only	No gap
Per-FR	FR2 if configured		12-23
measurement gap	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23

		E-UTRA and, FR1 if	non-NR RAT Note1,2	0, 1, 2, 3, 4, 6, 7, 8,10
		configured	and FR1 and FR2	
		FR2 if configured		12-23
Note:	In E-UT	RA-NR dual connectivity	mode, if GSM or UTF	RA TDD or UTRA FDD inter-RAT
				easurement gap pattern #0 and #1 can
	be used	I for per-FR gap in E-UTI	RA and FR1 if configu	red, or for per-UE gap.
NOTE 1:	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:	· *·*			
NOTE 3: When E-UTRA inter-frequency RSTD mea		RSTD measurements	are configured and the UE requires	
	measure	ement gaps for performir	ng such measurement	s, 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<sub>MG</sub> ms, the measurement gap for FR1 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms, the measurement gap for FR2 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms, the measurement gap for FR2 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms, the measurement gap for FR1 starts at time T<sub>MG</sub> 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<sub>MG</sub> ms, the measurement gap for FR2 starts at time T<sub>MG</sub> 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<sub>MG</sub> is the MG timing advance value provided in *mgta* according to TS38.331 [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.

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 <sup>NOTE3</sup>	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
Day I I E		FR1 and/or FR2	
Per-UE measurement		E-UTRA only NOTE3	0,1,2,3
gap		FR1 only	0-11
gap		FR1 and FR2	0-11
	FR2 NOTE5	E-UTRAN and	0, 1, 2, 3, 4, 6, 7, 8,10
		FR1 and/or FR2	
		FR2 only	12-23
	FR1 if configured	E-UTRA only NOTE3	0,1,2,3
	FR2 if configured		No gap
	FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	FR1 if configured	FR2 only	No gap
Per-FR	FR2 if configured		12-23
measurement	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured	NOTE3	No gap
	FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	FR1 if configured	E-UTRA and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	NOTE3	12-23
	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured and FR2 NO		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<sub>MG</sub> ms, the measurement gap starts at time T<sub>MG</sub> 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<sub>MG</sub> ms, the measurement gap for FR1 starts at time T<sub>MG</sub> 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.

 $T_{\text{MG}}$  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,

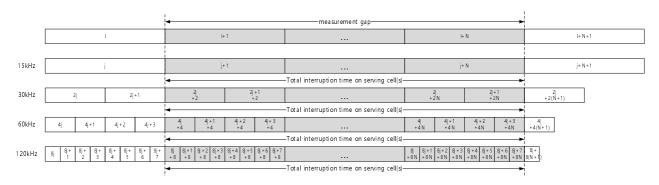
- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;

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.

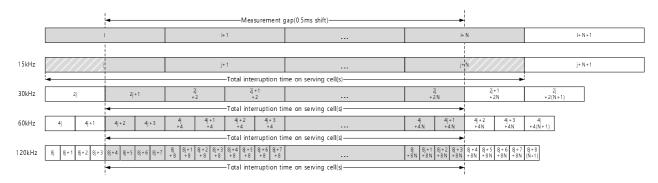
For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and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

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.

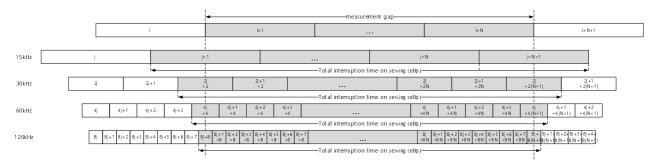
For NR-E-UTRA dual connectivity, if UE is not capable of per-FR-gap, total interruption time on MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in MCG during MGL is defined only when MGL(N) = 6ms, 4ms and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



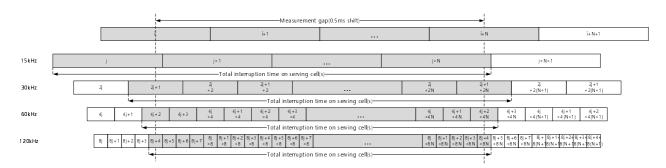
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



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



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

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC

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

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR		Total number of interrupted slots on serving cells				
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms
	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms
15	6	4	3	7 <sup>Note3</sup>	5 <sup>Note3</sup>	4 <sup>Note3</sup>
30	12	8	6	12	8	6
60	24	16	12	24	16	12
120	48	32	24	48	32	24

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

NOTE 3: Non-overlapped half-slots occur before and after the measurement gap.
Whether a Rel-15 UE can receive and/or transmit in those half-slots is up to
UE implementation.

Table 9.1.2-4a: Total number of interrupted slots on serving cells during MGL for Asynchronous EN-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR		Total number of interrupted slots on serving cells				
SCS	When MG t	When MG timing advance of 0ms is			iming advanc	ce of 0.5ms
(kHz)	applied				is applied	
	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms
15	7	5	4	7	5	4
30	13	9	7	13	9	7
60	25	17	13	25	17	13
120	49	33	25	49	33	25

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

In case that UE capable of per-FR measurement gap is configured with per-FR measurement gap for FR2 serving cells, total number of interrupted slots on FR2 serving cells during MGL is listed in Table 9.1.2-4b.

Table 9.1.2-4b: Total number of interrupted slots on FR2 serving cells during MGL for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR2

NR		Total number of interrupted slots on FR2 serving cells				
SCS (kHz)	When MG timing advance of 0ms is applied			When MG ti	ming advance applied	of 0.25ms is
	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms
60	22	14	6	22	14	6
120	44	28	12	44	28	12

NOTE 1: The total number of interrupted slots is based on that SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter *refServCellIndicator* is an FR2 serving cell.

NOTE 2: Slot occurs before or after the measurement gap may be interrupted additionally if SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter refServCellIndicator is an FR1 serving cell.

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		
which measurement 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.		

### 9.1.2.1b 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 9.1.5.2.3.

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

measG	apSharingScheme	Value of X (%)	
	'00'	Equal splitting	
	'01'	25	
	'10'	50	
	<b>'11'</b>	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.		

## 9.1.2.1c 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 9.1.5.2.4.

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	
ʻ11' 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.

## 9.1.3 UE Measurement capability

### 9.1.3.1 EN-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the EN-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN, inter-RAT NR, GSM, UTRA FDD and UTRA TDD carriers as configured by E-UTRA PCell, and inter-frequency NR carriers as configured by PSCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) 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<sub>freq, EN-DC</sub>, 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<sub>freq, EN-DC, E-UTRA</sub> 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

 $N_{\text{freq, EN-DC, NR, inter-RAT}}$  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 clause are applicable for UE configured with SA NR operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) 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-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

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<sub>freq, SA, E-UTRA</sub> is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22],

N<sub>freq, SA, NR</sub> is the number of NR inter-frequency carriers being monitored as configured by PCell.

### 9.1.3.1b NE-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by E-UTRA PSCell, inter-RAT E-UTRAN carriers as configured by PCell, and inter-frequency NR carriers as configured by PCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) 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<sub>freq, NE-DC, NR</sub> 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<sub>freq, NE-DC, E-UTRA, inter-RAT</sub> is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by PCell or via LPP [22],

 $N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$  is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by E-UTRA PSCell [15] or via LPP [22].

### 9.1.3.1c NR-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with NR-DC operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) as configured by PCell, and inter-frequency NR carriers as configured by PSCell is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR-DC operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is  $N_{freq, NR-DC}$ , which is defined as:

 $N_{\text{freq, NR-DC}} = N_{\text{freq, NR-DC, NR}} + N_{\text{freq, NR-DC, E-UTRA}}$ 

where

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

N<sub>freq, NR-DC, NR</sub> 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 boundaries 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 boundaries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

## 9.1.4 Capabilities for Support of Event Triggering and Reporting Criteria

### 9.1.4.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 9.1.4.2, the UE shall meet all other performance requirements defined in clause 9 and clause 10.

The UE can be requested to make measurements under different measurement identities defined in TS 38.331 [2]. Each measurement identity corresponds to either event-based reporting, periodic reporting, or no reporting. In case of event-based reporting, each measurement identity is associated with an event triggering criterion. In case of periodic

reporting, a measurement identity is associated with one periodic reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event triggering, periodic, and no reporting criteria the UE may be requested to track in parallel.

#### 9.1.4.2 Requirements

In this clause a reporting criterion corresponds to either one event (in the case of event-based reporting), or one periodic reporting criterion (in case of periodic reporting), or one no reporting criterion (in case of no reporting). For event-based reporting, each instance of event, with the same or different event identities, is counted as separate reporting criterion in Table 9.1.4.2-1.

The UE shall be able to support in parallel per category up to  $E_{cat}$  reporting criteria according to Table 9.1.4.2-1. For the measurement categories belonging to intra-frequency, inter-frequency, and inter-RAT measurements (i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the total number of reporting criteria as follows:

- For UE configured with EN-DC:  $E_{cat,EN-DC,NR} + E_{cat,EN-DC,E-UTRA}$ , where

 $E_{cat,EN-DC,NR} = 10 + 9 \times n$  is the total number of NR reporting criteria configured by PSCell (NR intra- and inter-frequency reporting criteria) and by E-UTRA PCell on NR serving frequencies (NR intra-frequency 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 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 <sub>cat</sub>	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-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5  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  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 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 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.	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
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 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	Inter-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5	10	capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-
RSRQ measurements for E-CID Note 2,4,5  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		1	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
= 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

- 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<sub>outside\_gap,i</sub> and CSSF<sub>within\_gap,i</sub>, 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<sub>outside\_gap,i</sub> 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.
- For a UE in E-UTRA-NR dual connectivity operation, NR inter-RAT measurement object configured by the E-UTRAN PCell on an NR serving carrier
  - the SSB is completely contained in the active BWP of the UE, and
  - none or part of the SMTC occasions of this inter-RAT 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.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurment object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF<sub>outside\_gap,i</sub> and requirements derived from CSSF<sub>outside\_gap,i</sub> 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  $T_{measure\_SFTD1}$  specified in clause 9.3.8 when no measurement gaps are provided.

The requirements in this clause apply provided that

- The SMTC on all CCs in FR2 have the same offset, and one of following conditions is met
  - If *smtc*2 is configured on any FR2 CC,
    - All CCs have the same configuration for *smtc1*, and
    - All CCs configured with *smtc2* have the same configuration for *smtc2*
- If *smtc2* is not configured on any FR2 CC,
  - The total number of different SMTC periodicities on all serving CCs does not exceed 4

Note: Longer delays for cell identification and measurement periods derived based on  $CSSF_{outside\_gap,i}$  in clauses 9.2.5.1, 9.2.5.2, can be expected, if the UE is configured with more than 4 different SMTC periodicities on FR2 serving carriers. The longer delay applies for the FR2 intra-frequency measurement objects with the longest SMTC periodicity/periodicities.

# 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<sub>outside\_gap,i</sub> 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<sub>outside\_gap,i</sub> scaling factor for EN-DC mode

Scenario	CSSF <sub>outside_ga</sub> p,i for FR1 PSCC	CSSF <sub>outside_gap</sub> , i for FR1 SCC	CSSF <sub>outside_gap,</sub> i for FR2 PSCC	CSSF <sub>outside_gap,i</sub> for FR2 SCC where neighbour cell measurement is required Note 2	CSSF <sub>outside_gap,i</sub> for FR2 SCC where neighbour cell measurement is not required
EN-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
EN-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCells
EN-DC with FR1 +FR2 CA (FR1 PSCell) Note	1	2×(Number of configured SCell(s)-1)	N/A	2 <sup>Note 5</sup>	2×(Number of configured SCell(s)-1)
EN-DC with FR1 +FR2 CA (FR2 PSCell) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

Note 1: Only one NR FR1 operating band and one NR FR2 operating band are included for FR1+FR2 inter-band EN-DC.

Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

Note 3: Void Note 4: Void

Note 5: CSSF<sub>outside\_gap,i</sub> =1 if only one SCell is configured.

Note 6: If a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2], otherwise they are counted separately as two measurement objects.

# 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<sub>outside\_gap,i</sub> 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<sub>outside\_gap,i</sub> scaling factor for SA mode

Scenario	CSSF <sub>outside_gap</sub> , i for FR1 PCC	CSSF <sub>outside_gap</sub> , i for FR1 SCC	CSSF <sub>outside_ga</sub> <sub>p,i</sub> for FR2 PCC	CSSF <sub>outside_gap,i</sub> for FR2 SCC where neighbour cell measurement is required	CSSF <sub>outside_gap,i</sub> 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 PCeII) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2 Note 5	2x(Number of configured SCell(s)-1)
FR1 +FR2 CA (FR2 PCeII) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

- 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.
- Note 3: Void
- Note 4: Void
- Note 5: CSSF<sub>outside\_gap,i</sub> =1 if only one SCell is configured.

# 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<sub>outside\_gap,i</sub> scaling factor for NR-DC mode

Scenario	CSSF <sub>outside_gap</sub> ,i for FR1 PCC	CSSF <sub>outside_gap,i</sub> for FR1 SCC	CSSF <sub>outside_gap,i</sub> for FR2 PSCC	CSSF <sub>outside_gap,i</sub> for FR2 SCC where neighbour cell measurement is not required
FR1 + FR2 NR- DC (FR1 PCell and FR2 PScell) Note 1	1	2×(Number of configured SCell(s))	2 Note 3	2×(Number of configured SCell(s))

Note 1: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG

in FR2.

Note 2: Void

Note 3: CSSF<sub>outside\_gap,i</sub> =1 if no SCell is configured.

# 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<sub>outside\_gap,i</sub> 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<sub>outside\_gap,i</sub> scaling factor for NE-DC mode

Scenario		CSSF <sub>outside_gap</sub>	_	CSSF <sub>outside_gap,i</sub> for FR2 SCC where	CSSF <sub>outside_gap,i</sub> for FR2 SCC where
	,	,	PCC	neighbour cell	neighbour cell

				measurement is required	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 Note 3	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.

Note 3: CSSF<sub>outside\_gap,i</sub> =1 if only one SCell is configured.

## 9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor  $CSSF_{within\_gap,i}$  for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement object with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement object with measurement gap in clause 9.2.6.
- Inter-frequency measurement object in clause 9.3.
- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.
- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.
- For a UE in E-UTRA-NR dual connectivity operation, NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR serving carrier
  - the SSB is not completely contained in the active BWP of the UE, or
  - all of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;
- NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR non-serving carrier.
- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).
- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).
- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).
- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF<sub>within\_gap,i</sub> and requirements derived from CSSF<sub>outside\_gap,i</sub> are not specified.

# 9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

The scaling value CSSF<sub>within\_gap,i</sub> below has been derived without considering GSM inter-RAT carriers.

For UE supporting per-FR gap, for each measurement object *i* that are measured based on effective MGRP as defined in clause 9.1.2, CSSF<sub>within\_gap,i</sub> used for derving the measurement requirements is defined as the total number of measurement objects in the same FR as measurement object *i*.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as  $CSSF_{within\_gap,i}$  and is derived as described in this clause.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same carrier, they shall be counted as one measurement object in M<sub>tot,i,j</sub>, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured,  $CSSF_{within\_gap,i}$ =1. Otherwise, the  $CSSF_{within\_gap,i}$  for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*
- An inter-RAT UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- M<sub>intra,i,j</sub>: 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<sub>intra,i,j</sub> equals 0.
- M<sub>inter,i,j</sub>: Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M<sub>inter,i,j</sub> equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$ : Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{\text{tot,i,j}}$  equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period,  $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$ .

The carrier specific scaling factor CSSF<sub>within gap,i</sub> is given by:

If measGapSharingScheme is equal sharing, CSSF<sub>within\_gap,i</sub>=  $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$ , where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is an intra-frequency measurement object, CSSF<sub>within\_gap,i</sub> 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<sub>within\_gap,i</sub> 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

Where  $R_i$  is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

Note: In this release of specification, longer delays for cell identification and measurement periods derived based on CSSF<sub>within\_gap,i</sub> can be expected, if the UE is configured with inter-RAT MO on NR serving CC by E-UTRAN PCell in EN-DC mode.

# 9.1.5.2.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as  $CSSF_{within\_gap,i}$  and is derived as described in this clause.

For UE supporting per-FR gap, for each measurement object *i* that are measured based on effective MGRP as defined in clause 9.1.2, CSSF<sub>within\_gap,i</sub> used for derving the measurement requirements is defined as the total number of measurement objects in the same FR as measurement object *i*.

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<sub>within\_gap,i</sub>=1. Otherwise, the the CSSF<sub>within\_gap,i</sub> for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF<sub>within\_gap,i</sub> are derived as below.

For each measurement gap *j* not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object, if to be measured with measurement gaps, is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- M<sub>intra,i,j</sub>: 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<sub>intra,i,j</sub> equals 0.
- M<sub>inter,i,j</sub>: 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<sub>inter,i,j</sub> equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$ : Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{\text{tot,i,j}}$  equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period,  $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$ .

The carrier specific scaling factor  $CSSF_{within\_gap,i}$  is given by:

- If measGapSharingScheme is equal sharing,  $CSSF_{within\_gap,i} = max(ceil(R_i \times M_{tot,i,j}))$ , where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
  - measurement object i is an intra-frequency measurement object, CSSF<sub>within\_gap,i</sub> is the maximum among
    - ceil( $R_i \times K_{intra} \times M_{intra,i,j}$ ) in gaps where  $M_{inter,i,j} \neq 0$ , where j=0...(160/MGRP)-1

- ceil( $R_i \times M_{intra,i,j}$ ) in gaps where  $M_{inter,i,j}=0$ , where j=0...(160/MGRP)-1
- measurement object i is an inter-frequency or inter-RAT measurement object,  $CSSF_{within\_gap,i}$  is the maximum among
  - ceil( $R_i \times K_{inter} \times M_{inter,i,j}$ ) in gaps where  $M_{intra,i,j} \neq 0$ , where j=0...(160/MGRP)-1
  - $ceil(R_i \times M_{inter,i,j})$  in gaps where  $M_{intra,i,j}=0$ , where j=0...(160/MGRP)-1
- Where R<sub>i</sub> is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

 $CSSF_{within\_gap,k}=1$  during  $T_{Detect, E-UTRAN FDD}$  specified in clause 9.4.4.1.2.2 and  $T_{Detect, E-UTRAN TDD}$  specified in clause 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on  $CSSF_{within\_gap,i}$  in clauses 9.2.5.1, 9.2.5.2, 9.2.6.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with  $T_{Detect, E-UTRAN FDD}$  and  $T_{Detect, E-UTRAN TDD}$ .

# 9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF<sub>within\_gap,i</sub> and is derived as described in this clause.

For UE supporting per-FR gap, for each measurement object *i* that are measured based on effective MGRP as defined in clause 9.1.2, CSSF<sub>within\_gap,i</sub> used for derving the measurement requirements is defined as the total number of measurement objects in the same FR as measurement object *i*.

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<sub>within\_gap,i</sub>=1. Otherwise, the CSSF<sub>within\_gap,i</sub> for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap *j* not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap *j*.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- If the number of configured inter-frequency and inter-RAT 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 intra-frequency measurement objects belong to group A
  - Inter-frequency and inter-RAT measurement objects belong to group B
  - M<sub>groupA,i,j</sub>: Sum of the number of FR1 intra-frequency measurement objects M<sub>intra-FR1,i,j</sub> and the number of FR2 intra-frequency measurement objects M<sub>intra-FR2,i,j</sub> which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M<sub>groupA,i,j</sub> equals 0.

- $M_{groupBi,j}$ : Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupB,i,j}$  equals 0.
- If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:
  - FR1 intra-frequency measurement objects belong to group A
  - FR2 intra-frequency measurement objects belong to group B
  - $M_{groupA,i,j}$ : The number of FR1 intra-frequency measurement objects  $M_{intra-FR1,i,j}$  which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupA,i,j}$  equals 0.
  - $M_{groupBi,j}$ : The number of FR2 intra-frequency measurement objects  $M_{intra-FR2,i,j}$  which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupB,i,j}$  equals 0.
- $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$ : Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{\text{tot,i,j}}$  equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period,  $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$ .

- The carrier specific scaling factor  $CSSF_{within\_gap,i}$  is given by:
- If measGapSharingScheme is equal sharing, CSSF<sub>within\_gap,i</sub>= max(ceil(R<sub>i</sub>×M<sub>tot,i,j</sub>)), where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
  - measurement object i is a group A measurement object, CSSF<sub>within\_gap,i</sub> is the maximum among
    - ceil( $R_i \times K_{intra} \times M_{groupA,i,j}$ ) in gaps where  $M_{groupB,i,j} \neq 0$ , where j=0...(160/MGRP)-1
    - $ceil(R_i \times M_{groupA,i,j})$  in gaps where  $M_{groupB,i,j}=0$ , where j=0...(160/MGRP)-1
  - measurement object i is an group B measurement object, CSSF<sub>within gap,i</sub> is the maximum among
    - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$  in gaps where  $M_{groupA,i,j} \neq 0$ , where j=0...(160/MGRP)-1
    - $ceil(R_i \times M_{groupB,i,j})$  in gaps where  $M_{groupA,i,j}=0$ , where j=0...(160/MGRP)-1
- Where R<sub>i</sub> is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

# 9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF<sub>within\_gap,i</sub> and is derived as described in this clause.

For UE supporting per-FR gap, for each measurement object i that are measured based on effective MGRP as defined in clause 9.1.2, CSSF<sub>within\_gap,i</sub> used for derving the measurement requirements is defined as the total number of measurement objects in the same FR as measurement object i.

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<sub>within\_gap,i</sub>=1. Otherwise, the CSSF<sub>within\_gap,i</sub> for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF<sub>within\_gap,i</sub> are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and inter-frequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

If the number of configured inter-frequency and inter-RAT 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 intra-frequency measurement objects belong to group A

Inter-frequency and inter-RAT measurement objects belong to group B

 $M_{groupA,i,j}$ : Sum of the number of FR1 intra-frequency measurement objects  $M_{intra-FR1,i,j}$  and the number of FR2 intra-frequency measurement objects  $M_{intra-FR2,i,j}$  which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupA,i,j}$  equals 0.

 $M_{groupBi,j}$ : Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupB,i,j}$  equals 0.

If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intra-frequency measurement objects belong to group A

FR2 intra-frequency measurement objects belong to group B

 $M_{groupA,i,j}$ : The number of FR1 intra-frequency measurement objects  $M_{intra-FR1,i,j}$  which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupA,i,j}$  equals 0.

 $M_{groupBi,j}$ : The number of FR2 intra-frequency measurement objects  $M_{intra-FR2,i,j}$  which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{groupB,i,j}$  equals 0.

 $M_{\text{tot},i,j} = M_{\text{groupA},i,j} + M_{\text{groupB},i,j}$ : Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise  $M_{\text{tot},i,j}$  equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period,  $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$ .

The carrier specific scaling factor CSSF<sub>within\_gap,i</sub> is given by:

If measGapSharingScheme is equal sharing, CSSF<sub>within gap,i</sub>= max(ceil(R<sub>i</sub>×M<sub>tot,i,j</sub>)), where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is a group A measurement object,  $CSSF_{within\_gap,i}$  is the maximum among
  - $ceil(R_i \times K_{intra} \times M_{groupA,i,j})$  in gaps where  $M_{groupB,i,j} \neq 0$ , where j=0...(160/MGRP)-1
  - $ceil(R_i \times M_{groupA,i,j})$  in gaps where  $M_{groupB,i,j}=0$ , where j=0...(160/MGRP)-1
- measurement object i is an group B measurement object, CSSF<sub>within\_gap,i</sub> is the maximum among
  - ceil( $R_i \times K_{inter} \times M_{groupBi,j}$ ) in gaps where  $M_{groupA,i,j} \neq 0$ , where j=0...(160/MGRP)-1
  - $ceil(R_i \times M_{groupB,i,j})$  in gaps where  $M_{groupA,i,j}=0$ , where j=0...(160/MGRP)-1
- R<sub>i</sub> is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

## 9.1.6 Minimum requirement at transitions

When the measurement on one intra-frequency measurement object transitions from measurements performed outside gaps to measurements performed within gaps or vice versa during one measurement period, the cell identification and measurement period requirements with the longer delay apply.

The carrier-specific scaling factor specified in clause 9.1.5 that applies to the other impacted measurement objects will also apply based on the longer measurement or cell identification delay before or after the transition.

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, the cell identification and measurement period requirements apply based on the longer delay before or after the transition.

Subsequent to this measurement period, the cell identification and measurement period requirements on each measurement object are corresponding to the second mode after transition.

## 9.2 NR intra-frequency measurements

### 9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

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

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE, or
- the active downlink BWP is initial BWP[3].

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB and measure RSSI of RSRQ which start earlier than the gap starting time + switching time, nor detect SSB and measure RSSI of RSRQ which end later than the gap end – switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

## 9.2.2 Requirements applicability

The requirements in clause 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

### 9.2.3 Number of cells and number of SSB

### 9.2.3.1 Requirements for FR1

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 8 identified cells, and
- 14 SSBs with different SSB index and/or PCI on the intra-frequency layer, where the number of SSBs in the serving cell (except for the SCell) is not smaller than the number of configured RLM-RS SSB resources.

### 9.2.3.2 Requirements for FR2

For one single intra-frequency layer in a band, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 6 identified cells, and
- 24 SSBs with different SSB index and/or PCI,

where this single intra-frequency layer 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
- PSCC when UE is configured with NR-DC with PSCC in the band; or
- One of the SCCs on which UE is configured to report SSB based measurements when neither PCC nor PSCC is in the same band, so that the selected SCC shall be an SCC where the UE is configured with SS-RSRP measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other intra-frequency layer(s) in the same band.

## 9.2.4 Measurement Reporting Requirements

### 9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

### 9.2.4.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.2.4.3.

## 9.2.4.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The UE shall not send any event triggered measurement reports as long as no reporting criteria is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$ . This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T  $_{identify\ intra\ with\ index}$  or T  $_{identify\ intra\ without\ index}$  defined in clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSBs measured from the Cell being configured remains detectable during the time period T  $_{identify\_intra\_without\_index}$  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  $\leq 5$  seconds and then the cell becomes detectable again with the same spatial reception parameter and triggers an event, the event triggered measurement reporting delay shall be less than TSSB\\_measurement\\_period\\_intra provided the timing to that cell has not changed more than  $\pm$  3200/2 $^{\mu}$  Tc while the measurement gap has not been available and L3 filtering has not been used, where  $\mu$  is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used, an additional delay can be expected.

## 9.2.5 Intrafrequency measurements without measurement gaps

#### 9.2.5.1 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within T<sub>identify\_intra\_without\_index</sub> 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<sub>identify\_intra\_with\_index</sub>. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T<sub>identify\_intra\_without\_index</sub>. 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<sub>intra</sub>: 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 intra-frequency 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 intra-frequency SMTC is fully overlapping with measurement gaps.

if the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss\_sync\_w/o\_gaps}: For \ a \ UE \ supporting \ FR2 \ power \ class \ 1, \ M_{pss/sss\_sync\_w/o\_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss\_sync\_w/o\_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss\_sync\_w/o\_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 4, \ M_{pss/sss\_sync\_w/o\_gaps} = 24$ 

 $M_{meas\_period\_w/o\_gaps}$ : 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 intra-frequency SMTC is fully non overlapping with measurement gaps or intra-frequency SMTC is fully overlapping with MGs, Kp=1

When intra-frequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1-(SMTC period /MGRP)), where SMTC period < MGRP. For calculation of Kp, if the high layer signalling (TS 38.331 [2]) of smtc2 is configured, for cells indicated in the pci-List parameter in smtc2, the SMTC periodicity corresponds to the value of higher layer parameter smtc2; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter smtc1.

If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for T<sub>identify\_intra\_without\_index</sub> or T<sub>identify\_intra\_with\_index</sub>

#### For FR2,

K<sub>layer1 measurement</sub>=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that SSB-ToMeasure and SS-RSSI-Measurement are configured, where SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged and RSSI symbols are indicated by SS-RSSI-Measurement;

 $K_{layer1\_measurement}$ =1.5, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG 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 MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG 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 <sub>p</sub> ) x SMTC period ) <sup>Note 1</sup> x
	CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max( 600ms, ceil(1.5x 5 x K <sub>p</sub> ) x max(SMTC
,	period,DRX cycle)) x CSSF <sub>intra</sub>
DRX cycle>320ms	ceil(5] x K <sub>p</sub> ) x DRX cycle x CSSF <sub>intra</sub>
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 <sub>PSS/SSS_sync_intra</sub>
No DRX	max(600ms, ceil(M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> x
	K <sub>laver1 measurement</sub> ) x SMTC period) <sup>Note 1</sup> x CSSF <sub>intra</sub>

DRX cycle ≤ 320ms	max(600ms, ceil(1.5 x Mpss/sss_sync_w/o_gaps x Kp x Klayer1_measurement) x max(SMTC period,DRX cycle)) x CSSFintra
DRX cycle>320ms	ceil(Mpss/sss_sync_w/o_gaps x Kp x Klayer1_measurement) x DRX cycle x CSSFintra
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified	

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

DRX cycle	Tssb_time_index_intra
No DRX	max(120ms, ceil( 3 x K <sub>p</sub> ) x SMTC period) <sup>Note 1</sup> x
	CSSFintra
DRX cycle ≤ 320ms	max(120ms, ceil (1.5 x 3 x K <sub>p</sub> ) x max(SMTC
,	period,DRX cycle)) x CSSF <sub>intra</sub>
DRX cycle>320ms	Ceil(3 x K <sub>p</sub> ) x DRX cycle x CSSF <sub>intra</sub>
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 (FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	Ceil(5 x K <sub>p</sub> ) x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle ≤ 320ms	Ceil(5 x K <sub>p</sub> ) x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	Ceil(5 x K <sub>p</sub> ) x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	Ceil(M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> ) x measCycleSCell x
	CSSFintra
DRX cycle≤ 320ms	Ceil(Mpss/sss_sync_w/o_gaps x Kp) x max(measCycleSCell,
,	1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	Ceil(M <sub>pss/sss_sync_w/o_gaps</sub> x K <sub>p</sub> ) x max(measCycleSCell,
•	DRX cycle) x CSSF <sub>intra</sub>

Table 9.2.5.1-6: Time period for time index detection, deactivated SCell (FR1)

DRX cycle	Tssb_time_index_intra
No DRX	Ceil(3 x K <sub>p</sub> ) x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle ≤ 320ms	Ceil(3 x K <sub>p</sub> ) x max(measCycleSCell, 1.5xDRX cycle) x
	CSSF <sub>intra</sub>
DRX cycle> 320ms	Ceil(3 x K <sub>p</sub> )x max(measCycleSCell, DRX cycle) x
	CSSF <sub>intra</sub>

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

#### 9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for TSSB\_measurement\_period\_intra

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG 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 MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG specified in Table 9.2.5.2-1, 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.

For FR2, a longer measurement period is allowed, if aperiodic CSI-RS resource is measured for L1-RSRP measurement on any FR2 serving frequency in the same band, and the CSI-RS resource is outside measurement gap and overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols. If *SSB-ToMeasure* or *SS-RSSI-Measurement* is configured, the SSB symbols are indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same band which can be merged and the RSSI symbols are indicated by *SS-RSSI-Measurement*.

Table 9.2.5.2-1: Measurement period for intrafrequency measurements without gaps(FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, ceil( 5 x K <sub>p</sub> ) x SMTC period) <sup>Note 1</sup> x
	CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5 x K <sub>p</sub> ) x max(SMTC period,DRX
•	cycle)) x CSSF <sub>intra</sub>
DRX cycle>320ms	ceil( 5 x K <sub>p</sub> ) x DRX cycle x CSSF <sub>intra</sub>
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 intra-frequency measurements without gaps(FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, ceil(M <sub>meas_period_w/o_gaps</sub> x K <sub>p</sub> x
	K <sub>layer1_measurement</sub> ) x SMTC period) <sup>Note 1</sup> x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max(400ms, ceil(1.5x M <sub>meas_period_w/o_gaps</sub> x K <sub>p</sub> x
	K <sub>layer1_measurement</sub> ) x max(SMTC period,DRX cycle)) x
	CSSFintra
DRX cycle>320ms	ceil(M <sub>meas_period_w/o_gaps</sub> xK <sub>p</sub> x K <sub>layer1_measurement</sub> ) x DRX
	cycle x CSSF <sub>intra</sub>
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	d

Table 9.2.5.2-3: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1)

DRX cycle	T <sub>SSB_measurement_period_intra</sub>
No DRX	Ceil(5 x K <sub>p</sub> ) x measCycleSCell x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	Ceil(5 x K <sub>p</sub> ) x max(measCycleSCell, 1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	Ceil(5 x K <sub>p</sub> )x max(measCycleSCell, DRX cycle) x CSSF <sub>intra</sub>

Table 9.2.5.2-4: Measurement period for intra-frequency measurements without gaps (deactivated SCell) FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	Ceil(M <sub>meas_period_w/o_gaps</sub> x K <sub>p</sub> ) x measCycleSCell x
	CSSF <sub>intra</sub>
DRX cycle≤ 320ms	Ceil(Mmeas_period_w/o_gaps x Kp) x max(measCycleSCell,
	1.5xDRX cycle) x CSSF <sub>intra</sub>
DRX cycle> 320ms	Ceil(Mmeas_period_w/o_gaps x Kp) x max(measCycleSCell,
·	DRX cycle) x CSSF <sub>intra</sub>

#### 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 the union set of *SSB-ToMeasure* from all the configured measurement objects on the same serving carrier which can be merged [2], if it is configured; otherwise, all *L* SSB symbols within SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

#### 9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the SMTC periodicity follows *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 signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1* 

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

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

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If *deriveSSB\_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.
- If *deriveSSB\_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

If the following conditions are met:

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

The UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and/or the corresponding PDSCH, on SSB symbols to be measured.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

#### 9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling *deriveSSB\_IndexFromCell* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

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

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB\_IndexFromCellc* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

If following conditions are met:

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

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

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

## 9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer.

#### 9.2.5.4 SFTD Measurements between PCell and PSCell

#### 9.2.5.4.1 Introduction

This clause contains SFTD measurement requirements for UE which supports NR-DC and is configured with a PSCell in RRC\_CONNECTED state. The UE shall perform SFTD measurement between PCell and PSCell, and report the SFTD result with/without SS-RSRP after the network requests with *reportType* for the associated *reportConfig* set to *reportSFTD*. The overall delay includes RRC procedure delay 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<sub>measure SFTD1</sub>) 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 <sub>measure_</sub> SFTD1 (s)
≤0.04	max(0.2, 5 x SMTC period) (Note2)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note 1: SMTC period in this table refers to the maximum between the configured SMTC period in PCell and PSCell.  Note 2: Number of DRX cycles depends upon the DRX cycle in use DRX cycle length in this table refers to the DRX cycle length configured for PCell or PSCell. When DRX is used in both PCell and PSCell, DRX cycle length in this table refers to the longer of the DRX cycle lengths for PCell and PSCell.	

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed  $T_{measure\_SFTD2}$  as defined by the following expression:

$$T_{measure\_SFTD2} = (M+1)*(T_{measure\_SFTD1}) + M*T_{PSCell\_change\_NRDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period (Tmeasure\_SFTD2), and

T<sub>PSCell change NRDC</sub> 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<sub>DCCH</sub>. 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 Intra-frequency measurements with measurement gaps

#### 9.2.6.1 Void

#### 9.2.6.2 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within T<sub>identify\_intra\_without\_index</sub> 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<sub>identify\_intra\_with\_index</sub>. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T<sub>identify\_intra\_without\_index</sub>. 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<sub>PSS/SSS sync intra</sub>: 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 9.2.6.3-1 or 9.2.6.3-2.

 $CSSF_{intra}$ : 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] 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  $T_{identify\_intra\_without\_index}$  or  $T_{identify\_intra\_with\_index}$ .

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.2-1: Time period for PSS/SSS detection (FR1)

DRX cycle	T <sub>PSS/SSS_sync_intra</sub>	
No DRX	max(600ms, 5 x max(MGRP, SMTC period)) x	
	CSSF <sub>intra</sub>	
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5) x max(MGRP, SMTC	
,	period,DRX cycle)) x CSSF <sub>intra</sub>	
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF <sub>intra</sub>	

Table 9.2.6.2-2: Time period for PSS/SSS detection (FR2)

DRX cycle	TPSS/SSS_sync_intra	
No DRX	max(600ms, M <sub>pss/sss_sync_with_gaps</sub> x max(MGRP, SMTC	
	period)) x CSSF <sub>intra</sub>	
DRX cycle≤ 320ms	max(600ms, ceil(1.5x Mpss/sss_sync_with_gaps) x	
,	max(MGRP, SMTC period, DRX cycle)) x CSSF <sub>intra</sub>	
DRX cycle>320ms	M <sub>pss/sss_sync_with_gaps</sub> x max(MGRP, DRX cycle) x	
	CSSF <sub>intra</sub>	

Table 9.2.6.2-3: Time period for time index detection (FR1)

DRX cycle	T <sub>SSB_time_index_intra</sub>	
No DRX	max(120ms, 3 x max(MGRP, SMTC period)) x	
	CSSF <sub>intra</sub>	
DRX cycle≤ 320ms	max(120ms, ceil(1.5x 3) x max(MGRP, SMTC	
	period,DRX cycle) x CSSF <sub>intra</sub> )	
DRX cycle>320ms	3 x max(MGRP, DRX cycle) x CSSF <sub>intra</sub>	

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

#### 9.2.6.3 Intra-frequency Measurement Period

The measurement period for FR1 intra-frequency measurements with gaps is as shown in table 9.2.6.3-1.

The measurement period for FR2 intra-frequency measurements with gaps is as shown in table 9.2.6.3-2.

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG 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 intra-frequency measurements with gaps(FR1)

DRX cycle	T SSB_measurement_period_intra	
No DRX	max(200ms, 5 x max(MGRP, SMTC period)) x	
	CSSF <sub>intra</sub>	
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5) x max(MGRP, SMTC	
	period,DRX cycle)) x CSSF <sub>intra</sub>	
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF <sub>intra</sub>	

Table 9.2.6.3-2: Measurement period for intra-frequency measurements with gaps(FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, M <sub>meas_period with_gaps</sub> x max(MGRP, SMTC
	period)) x CSSF <sub>intra</sub>
DRX cycle≤ 320ms	max(400ms, ceil(1.5 x M <sub>meas_period with_gaps</sub> ) x max(MGRP, SMTC period, DRX cycle)) Note 1 x
	• • • • • • • • • • • • • • • • • • • •
	CSSF <sub>intra</sub>
DRX cycle>320ms	M <sub>meas_period with_gaps</sub> x max(MGRP, DRX cycle) x
	CSSFintra

## 9.3 NR inter-frequency measurements

#### 9.3.1 Introduction

A measurement is defined as an SSB based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.2.

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

SSB based measurements are configured along with a measurement timing configuration (SMTC) per carrier, which provides periodicity, duration and offset information on a window of up to 5ms where the measurements on the configured inter-frequency carrier are to be performed. For inter-frequency connected mode measurements, one measurement window periodicity may be configured per inter-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB and measure RSSI of RSRQ on an interfrequency measurement object which starts earlier than the gap starting time + switching time, nor detect SSB and measure RSSI of RSRQ which ends later than the gap end – switching time. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

## 9.3.2 Requirements applicability

The requirements in clause 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB\_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

#### 9.3.2.1 Void

9.3.2.2 Void

#### 9.3.3 Number of cells and number of SSB

#### 9.3.3.1 Requirements for FR1

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 7 SSBs with different SSB index and/or PCI on the inter-frequency layer.

#### 9.3.3.2 Requirements for FR2

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 10 SSBs with different SSB index and/or PCI on the inter-frequency layer, and
- 1 SSB per identified cell.

## 9.3.4 Inter-frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_without\_index}$  if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within  $T_{identify\_inter\_with\_index}$ . The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within  $T_{identify\_inter\_without\_index}$ .

$$T_{identify\_inter\_without\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter}) ms$$

$$T_{identify\_inter\_with\_index} = (T_{PSS/SSS\_sync\_inter} + T_{SSB\_measurement\_period\_inter} + T_{SSB\_time\_index\_inter}) \ ms$$

Where:

T<sub>PSS/SSS sync inter</sub>: it is the time period used in PSS/SSS detection given in table 9.3.4-1 and table 9.3.4-2.

 $T_{SSB\_time\_index\_inter}$ : it is the time period used to acquire the index of the SSB being measured given in table 9.3.4-3 and table 9.3.4-4.

 $T_{SSB\_measurement\_period\_inter}$ : equal to a measurement period of SSB based measurement given in table 9.3.5-1 and table 9.3.5-2.

 $M_{pss/sss\_sync\_inter}$ : For a UE supporting FR2 power class 1,  $M_{pss/sss\_sync\_inter} = 64$  samples. For a UE supporting FR2 power class 2,  $M_{pss/sss\_sync\_inter} = 40$  samples. For a UE supporting FR2 power class 3,  $M_{pss/sss\_sync\_inter} = 40$  samples. For a UE supporting FR2 power class 4,  $M_{pss/sss\_sync\_inter} = 40$  samples.

 $M_{SSB\_index\_inter}$ : For a UE supporting FR2 power class 1,  $M_{SSB\_index\_inter} = 40$  samples. For a UE supporting FR2 power class 2,  $M_{SSB\_index\_inter} = 24$  samples. For a UE supporting FR2 power class 3,  $M_{SSB\_index\_inter} = 24$  samples. For a UE supporting FR2 power class 4,  $M_{SSB\_index\_inter} = 24$  samples.

 $M_{meas\_period\_inter}$ : For a UE supporting FR2 power class 1,  $M_{meas\_period\_inter}$  =64 samples. For a UE supporting FR2 power class 2,  $M_{meas\_period\_inter}$ =40 samples. For a UE supporting FR2 power class 3,  $M_{meas\_period\_inter}$ =40 samples. For a UE supporting FR2 power class 4,  $M_{meas\_period\_inter}$ =40 samples.

 $CSSF_{inter}$ : it is a carrier specific scaling factor and is determined according to  $CSSF_{within\_gap,i}$  in clause 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	Tpss/sss_sync_inter		
No DRX	$Max(600ms, 8 \times Max(MGRP, SMTC period)) \times CSSF_{inter}$		
DRX cycle ≤ 320ms	Max(600ms, Ceil(8*1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF <sub>inter</sub>		
DRX cycle > 320ms	8 × DRX cycle × CSSF <sub>inter</sub>		
NOTE 4. DDV as an DDV as a single as a to a such a search as to the search time a search at its allower 0.04			

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

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

Condition NOTE1,2	T <sub>PSS/SSS_sync_inter</sub>		
No DRX	Max(600ms, Mpss/sss_sync_inter × Max(MGRP, SMTC period)) × CSSFinter		
DRX cycle ≤ 320ms	Max(600ms, (1.5 × M <sub>pss/sss_sync_inter</sub> ) × Max(MGRP, SMTC period, DRX cycle)) ×		
	CSSF <sub>inter</sub>		
DRX cycle > 320ms	Mpss/sss_sync_inter $\times$ DRX cycle $\times$ CSSF <sub>inter</sub>		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			

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

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

Condition NOTE1,2	T <sub>SSB_time_index_inter</sub>		
No DRX	Max(120ms, 3 × Max(MGRP, SMTC period)) × CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	Max(120ms, Ceil(3 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF <sub>inter</sub>		
DRX cycle > 320ms	3 × DRX cycle × CSSF <sub>inter</sub>		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for			
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

Table 9.3.4-4: Time period for time index detection (Frequency range FR2)

Condition NOTE1,2	T <sub>SSB_time_index_inter</sub>		
No DRX	Max(200ms, M <sub>SSB_index_inter</sub> × Max(MGRP, SMTC period)) × CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	Max(200ms, (1.5 × M <sub>SSB_index_inter</sub> ) × Max(MGRP, SMTC period, DRX cycle)) ×		
	CSSF <sub>inter</sub>		
DRX cycle > 320ms	$M_{SSB\_index\_inter} \times DRX \ cycle \times CSSF_{inter}$		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

9.3.4.1 Void

Void 9.3.4.2

#### 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-RSRO and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-1: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

Condition NOTE1,2	T SSB_measurement_period_inter		
No DRX	Max(200ms, 8 × Max(MGRP, SMTC period)) × CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	Max(200ms, Ceil(8 × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF <sub>inter</sub>		
DRX cycle > 320ms	8 × DRX cycle × CSSF <sub>inter</sub>		

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 <sub>SSB_measurement_period_inter</sub>		
No DRX	Max(400ms, M <sub>meas_period_inter</sub> × Max(MGRP, SMTC period)) × CSSF <sub>inter</sub>		
DRX cycle ≤ 320ms	Max(400ms, (1.5 × M <sub>meas_period_inter</sub> ) × Max(MGRP, SMTC period, DRX cycle)) ×		
-	CSSF <sub>inter</sub>		
DRX cycle > 320ms	e > 320ms		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

9.3.5.1 Void

9.3.5.2 Void

9.3.5.3 Void

#### 9.3.6 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  $\leq 5$  seconds and then the cell becomes detectable again with the same spatial reception parameter and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than  $T_{SSB\_measurement\_period\_inter}$  defined in clause 9.3.5 provided the timing to that cell has not changed more than  $\pm$  3200/2 $^{\mu}$  Tc while measurement gap has not been available and the L3 filtering has not been used, where  $\mu$  is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used an additional delay can be expected.

#### 9.3.7 Void

## 9.3.8 Inter-frequency SFTD measurement requirements

#### 9.3.8.1 Introduction

This clause contains requirements for a UE supporting NR inter-frequency SFTD measurement and is applicable in RRC\_CONNECTED state. The UE shall, depending on network request, perform inter-frequency SFTD measurement and report SFTD result with or without SS-RSRP. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2] and SFTD measurement reporting delay in clause 9.3.8.3.

UE which fulfils the requirements in clause 9.3.8 is not supposed to fulfil the requirements defined in clause 9.2.5.4.

#### 9.3.8.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this clause are applicable under the side condition SCH  $\hat{E}s/Iot \ge -3$  dB for the inter-frequency neighbour cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest applicable inter-frequency neighbour cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more strongest cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell regardless of its SSB position in the SMTC period, provided that the carrier frequency where SFTD measurement is configured and the serving carrier(s) form a supported CA or NR-DC band combination of the UE. The SFTD measurement shall be conducted with sustained connection to the PCell and activated SCell(s) in MCG. Depending on capability, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 8.2.2.2.6.

When measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of  $T_{measure\ SFTD1}$  as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
  - For carrier frequency in FR1: T<sub>measure\_SFTD1</sub> = 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<sub>measure\_SFTD1</sub> = CSSF<sub>inter</sub> × 8 × Max(MGRP, SMTC period)
  - For carrier frequency in FR2: T<sub>measure\_SFTD1</sub> = CSSF<sub>inter</sub> × 64 × Max(MGRP, SMTC period)
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
  - For carrier frequency in FR1: T<sub>measure\_SFTD1</sub> = 19 SMTC periods
  - For carrier frequency in FR2: T<sub>measure\_SFTD1</sub> = 152 SMTC periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
  - For carrier frequency in FR1: T<sub>measure SFTD1</sub> = CSSF<sub>inter</sub> × 13 × Max(MGRP, SMTC period)
  - For carrier frequency in FR2: T<sub>measure\_SFTD1</sub> = CSSF<sub>inter</sub> × 104 × Max(MGRP, SMTC period)

where CSSF<sub>inter</sub> is a carrier specific scaling factor and is determined according to CSSF<sub>within\_gap,i</sub> 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. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of  $2 \times TTI_{DCCH}$  resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than  $T_{measure\_SFTD1}$  defined in clause 9.3.8.2 plus the RRC procedure delay defined in TS 38.331 [2].

#### 9.4 Inter-RAT measurements

#### 9.4.1 Introduction

The requirements in this clause are specified for NR–E-UTRAN FDD and NR–E-UTRAN TDD measurements and are applicable without an explicit E-UTRAN neighbour cell list containing physical layer cell identities, for a UE:

- in RRC\_CONNECTED state, and

- configured with SA or NR-DC operation mode or configured in NE-DC operation mode by PCell with NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) on E-UTRA non-serving frequency carrier, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, or E-CID RSRP and RSRQ) 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<sub>Inter1</sub> 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	Measurement Gap 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 <sup>Note 1</sup>
3	3	80	12 <sup>Note 1</sup>
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 <sup>Note 1,5,6</sup>
10	3	20	48 Note 1
NOTE 1: When determining UE requirements using Tinter1 for gap pattern IDs 2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for gap pattern IDs 2, 4, 6, 7, 10, and Tinter1 = 30 for gap pattern IDs 3 and 8 shall be used.			

NOTE 2: Measurement gaps pattern configurations applicability is as specified in Table 9.1.2-1.

NOTE 3: When this gap pattern is used, the T<sub>inter</sub> 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<sub>inter</sub> 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<sub>inter</sub> 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  $\mu s$  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  $\mu$ s from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends no later than 1500 μs before the end of the measurement gap in case of FDD and no later than 1750 μs before the end of measurement gap in case of TDD.

#### 9.4.2 NR – E-UTRAN FDD measurements

#### 9.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN FDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

#### 9.4.2.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD cell within T<sub>Identify</sub>, E-UTRAN FDD according to the following expression:

$$T_{\text{Identify,E-UTRAN FDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Intert}}} \cdot \text{CSSF}_{\text{interRAT}} \quad ms.$$

where:

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

T<sub>Inter1</sub> 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 <sub>Measure, E-UTRAN FDD</sub> [ms]	Measurement bandwidth [RB]
0	480 x CSSF <sub>interRAT</sub>	6
1 (Note 1) 240 x CSSF <sub>interRAT</sub> 50		50
NOTE 1: This configuration is optional.		

When measurement gaps are scheduled for E-UTRAN FDD inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement period  $T_{\text{Measure}, E-UTRAN FDD}$  given by table 9.4.2.2-1.

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

 $The \ NR-E-UTRAN\ FDD\ RSRP\ measurement\ accuracy\ for\ all\ measured\ cells\ shall\ be\ as\ specified\ in\ clause\ 10.2.2.$ 

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

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

#### 9.4.2.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN FDD cell within  $T_{Identify, E-UTRAN \, FDD}$  specified in Table 9.4.2.3-1.

Table 9.4.2.3-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (S) (DRX cycles)	
	Gap period = 40 ms, 20 ms	Gap period = 80 ms
≤0.16	Non-DRX requirements in	Non-DRX requirements in
	clause 9.4.2.2 apply	clause 9.4.2.2 apply
0.256	5.12* CSSFinterRAT	7.68* CSSF <sub>interRAT</sub>
	(20*CSSFinterRAT)	(30*CSSFinterRAT)
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT
	(20*CSSF <sub>interRAT</sub> )	(24*CSSF <sub>interRAT</sub> )
0.32< DRX-cycle ≤	Note1 (20*CSSF <sub>interRAT</sub> )	Note1 (20*CSSF <sub>interRAT</sub> )
10.24		
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF <sub>interRAT</sub> is as defined in clause 9.4.2.2.		

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period  $T_{\text{measure}, E-UTRAN FDD}$  specified in Table 9.4.2.3-2.

Table 9.4.2.3-2: Requirement to measure E-UTRAN FDD cells

DRX cycle length (s)	T <sub>measure, E-UTRAN FDD</sub> (s) (DRX cycles)
≤0.08	Non-DRX requirements in clause 9.4.2.2 apply
0.08< DRX-cycle ≤10.24	Note1 (5* CSSF <sub>interRAT</sub> )
NOTE 1: The time depends on the DRX cycle length. NOTE 2: CSSF <sub>interRAT</sub> 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<sub>DCCH</sub> where TTI<sub>DCCH</sub> 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  $\leq 5$  seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than  $T_{Measure, E-UTRAN \, FDD}$  provided the timing to that cell has not changed more than  $\pm 50 \, \text{Ts}$  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, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN TDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],

RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

#### 9.4.3.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable TDD cell within T<sub>Identify, E-UTRAN TDD</sub> according to the following expression:

- When configuration 0 or configuration 1 in Table 9.4.3.2-1 is applied,

$$T_{\text{Identify,E-UTRAN TDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Inter1}}} \cdot \text{CSSF}_{\text{interRAT}} \quad ms,$$

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

$$T_{\rm Identify,E-UTRAN\ TDD} = T_{\rm Basic Identify} \cdot \frac{_{480}}{_{T_{\rm Inter1}}} \cdot {\rm CSSF}_{\rm interRAT} + 240 \cdot {\rm CSSF}_{\rm interRAT} \quad ms,$$

where:

 $T_{BasicIdentify} = 480 \ ms,$ 

T<sub>Inter1</sub> is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within\_gap,i}$  is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of  $T_{\text{Measure, E-UTRAN TDD}}$  defined in Table 9.4.3.2-1.

CSSF<sub>interRAT</sub>

Number of UL/DL sub-**DwPTS** Configuration Measurement T<sub>Measure</sub>, E-UTRAN bandwidth frames per half frame (5 ms) TDD (ms) (RB) DL UL Normal Extende CP d CP 0 2 2 6 480 x  $19760 \cdot T_{s}$ 20480·T<sub>s</sub>  $CSSF_{interRAT}$ 1 (Note 1) 50 2 2 240 x  $19760 \cdot T_{s}$  $20480 \cdot T_{s}$  $CSSF_{\text{interRAT}}$ 2 6 1 3 720 x  $19760 \cdot T_{s}$ 20480·T CSSFinterRAT 3 (Note 1) 50 1 3 480 x  $19760 \cdot T_{c}$  $20480 \cdot T_{c}$ 

Table 9.4.3.2-1: T<sub>Measure, E-UTRAN TDD</sub> for different configurations

NOTE 1: This configuration is optional.

NOTE 2: Void

When measurement gaps are scheduled for E-UTRAN TDD inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement period  $T_{\text{measure}, E-UTRAN TDD}$  given by table 9.4.3.2-1.

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)	T <sub>Identify</sub> , E-UTRAN TDD (s) (DRX cycles)	
	Gap period = 40 ms, 20	Gap period = 80 ms
	ms	
≤0.16	Non-DRX requirements in	Non-DRX requirements in
	clause 9.4.3.2 apply	clause 9.4.3.2 apply
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT
	(20*CSSFinterRAT)	(30*CSSFinterRAT)
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT
	(20*CSSFinterRAT)	(24*CSSFinterRAT)
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF <sub>interRAT</sub> )	Note1 (20*CSSF <sub>interRAT</sub> )
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF <sub>interRAT</sub> is as defined in clause 9.4.3.2.		

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period  $T_{\text{measure}, E-UTRAN TDD}$  specified in Table 9.4.3.3-2.

Table 9.4.3.3-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN TDD (s) (DRX cycles)
≤0.08	Non-DRX Requirements in clause 9.4.3.2 apply

0.128	For configuration 2 Note3, non-DRX requirements in clause 9.4.3.2 apply, Otherwise: Note1 (5*CSSF <sub>interRAT</sub> )
0.128 <drx-cycle≤ 10.24</drx-cycle≤ 	Note1 (5*CSSF <sub>interRAT</sub> )
NOTE 1: The time depends on the DRX cycle length.  NOTE 2: CSSF <sub>interRAT</sub> is as defined in clause 9.4.3.2.  NOTE 3: See Table 9.4.3.2-1.	

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

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

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

#### 9.4.3.4 Measurement reporting requirements

#### 9.4.3.4.1 Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

#### 9.4.3.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.3.4.3.

#### 9.4.3.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$  where  $TTI_{DCCH}$  is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T  $_{\text{Identify, E-UTRAN TDD}}$  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  $\leq 5$  seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than  $T_{Measure, E-UTRAN \, TDD}$  provided the timing to that cell has not changed more than  $\pm 50 \, \text{Ts}$  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].

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the  $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$  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  $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$  starts.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the  $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$  time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the  $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$  starts.

#### 9.4.4.1.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT E-UTRAN FDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within  $T_{RSTD\ InterRAT\ E-UTRAN\ FDD}$  ms as given below:

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

where

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

 $T_{\rm PRS}$  is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.1.2-1, where each PRS positioning occasion comprises of  $N_{PRS}$  (1 $\leq$   $N_{PRS}$   $\leq$ 6) consecutive downlink positioning subframes defined in TS 36.211 [23],

 $CSSF_{interRAT} = CSSF_{within\_gap,i}$  is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

$$\Delta = 160 \cdot \left[ \frac{n}{M} \right]$$
 ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN FDD carrier frequencies.

Table 9.4.4.1.2-1: Number of PRS positioning occasions within  $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ 

Positioning subframe	Number of PRS posit	tioning occasions $M$
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 × CSSFinterRAT	32 × CSSFinterRAT
>160 ms	8 × CSSFinterRAT	16 × CSSFinterRAT
NOTE 1: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN FDD carrier frequency f2.		
NOTE 2: When inter-RAT E-LITRAN EDD RSTD measurements are performed over the reference cell		

NOTE 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  $T_{RSTD InterRAT, E-UTRAN FDD}$  provided:

$$(PRS \, \hat{E}_s / Iot)_{ref} \ge -6 \, dB$$
 for all Frequency Bands for the reference cell,  $(PRS \, \hat{E}_s / Iot)_i \ge -13 \, dB$  for all Frequency Bands for neighbour cell  $i$ ,

$$\left(\text{PRS }\hat{\mathbf{E}}_{s} / \text{Iot}\right)_{ref}$$
 and  $\left(\text{PRS }\hat{\mathbf{E}}_{s} / \text{Iot}\right)_{i}$  conditions apply for all subframes of at least  $L = \frac{M}{2}$  PRS positioning occasions,

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

 $PRS\,\hat{E}_s$  / Iot is defined as the ratio of the average received energy per PRS resource element during the useful part of the symbol to the average received power spectral density of the total noise and interference for this resource element, where the ratio is measured over all resource elements which carry PRS.

The time  $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$  starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells i shall be fulfilled according to the accuracy as specified in clause 10.2.4.

#### 9.4.4.1.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$  where  $TTI_{DCCH}$  is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

#### 9.4.4.1.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

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

#### where

 $T_{Detect, E-UTRAN \ FDD} = T_{Identify, E-UTRAN \ FDD}$  -  $T_{measure, E-UTRAN \ FDD}$  is according to clause 9.4.2 assuming CSSF<sub>interRAT</sub>=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 and/or PHICH configuration 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 ECGI acquisition is not needed), and

 $T_{ECGI} = 100$  ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when *cellGlobalId* is included in *OTDOA-ReferenceCellInfo* and the UE is not aware of the ECGI of this cell ( $T_{ECGI} = 0$  when *cellGlobalId* is not included in *OTDOA-ReferenceCellInfo* or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.2.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within  $T_{RefCell,E-UTRAN}$  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 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<sub>MIB</sub>

NACK/NACK, MIB, FDD	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	scs
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz
NOTE 1: TDD UL-DL 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 9.4.4.1.2.2-2: Void

Table 9.4.4.1.2.2-3: Number of ACK/NACKs transmitted by the UE during T<sub>MIB</sub>+T<sub>ECGI</sub>

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].

When the UE is in NE-DC operation mode and an NR-E-UTRAN TDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

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  $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$  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  $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$  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  $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$  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  $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$  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:

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

where

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

 $T_{\rm PRS}$  is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.2.2-1, where a PRS positioning occasion is as defined in clause 9.4.4.1.2,

 $CSSF_{interRAT} = CSSF_{within\_gap,i}$  is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in 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 posi	tioning occasions $M$
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT
>160 ms	8 x CSSF <sub>interRAT</sub>	16 x CSSF <sub>interRAT</sub>

NOTE 1: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN TDD carrier frequency f2.

NOTE 2: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN TDD carrier frequency f1 and the E-UTRAN TDD carrier frequency f2 respectively.

The requirements in this clause shall apply for all TDD special subframe configurations specified in TS 36.211 [23] and for the TDD uplink-downlink configurations as specified in Table 9.4.4.2.2-2 for UE requiring measurement gaps for these measurements. For UEs capable of performing inter-RAT RSTD measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 9.4.4.2.2-3 shall apply.

Table 9.4.4.2.2-2: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations
6, 15	3, 4 and 5
25	1, 2, 3, 4, 5 and 6
50, 75, 100 0, 1, 2, 3, 4, 5 and 6	
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].	

Table 9.4.4.2.2-3: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements without gaps

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations
6, 15	1, 2, 3, 4 and 5
25, 50, 75, 100	0, 1, 2, 3, 4, 5 and 6
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].	

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within  $T_{\text{RSTD InterRAT, E-UTRAN TDD}}$  provided:

 $(PRS \, \hat{E}_s / Iot)_{ref} \ge -6 \, dB$  for all Frequency Bands for the reference cell,  $(PRS \, \hat{E}_s / Iot)_i \ge -13 \, dB$  for all Frequency Bands for neighbour cell i,  $(PRS \, \hat{E}_s / Iot)_{ref}$  and  $(PRS \, \hat{E}_s / Iot)_i$  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 as defined in clause 9.4.4.1.2.

The time  $T_{\text{RSTD InterRAT,E-UTRAN TDD}}$  starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

#### 9.4.4.2.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$  where  $TTI_{DCCH}$  is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

#### 9.4.4.2.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra*-

FineTimingDetection according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

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

where

 $T_{Detect, E-UTRAN \ TDD} = T_{Identify, E-UTRAN \ TDD}$  -  $T_{measure, E-UTRAN \ TDD}$  is according to clause 9.4.3 assuming CSSF<sub>interRAT</sub>=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 and/or PHICH configuration 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 ECGI acquisition is not needed), and

 $T_{ECGI} = 100$  ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ( $T_{ECGI} = 0$  when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.3.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within  $T_{RefCell,E-UTRAN}$  is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When  $T_{MIB}>0$  and UE is using autonomous gaps during  $T_{MIB}$ , the UE shall transmit at least  $N_{ACK/NACK, MIB, TDD}$  ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.2.2.2-1. When 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<sub>MIB</sub>

Nack/nack, mib, tdd		Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	scs	
15	FDD	15 kHz	
39	FDD	30 kHz	
85	FDD	60 kHz	
0	TDD Note 1	15 kHz	

4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz
NOTE 1: TDD UL-DL 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 9.4.4.2.2.2-2: Void

Table 9.4.4.2.2.2-3: Minimum number of ACK/NACKs transmitted by the UE during TMIB+TEGGI

NACK/NACK, MIB+ECGI, TDD	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].

#### 9.4.5 Inter-RAT E-CID measurements

#### 9.4.5.1 NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements

#### 9.4.5.1.1 Introduction

The requirements in clause 9.4.5.1. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN FDD E-CID RSRP and RSRQ measurements [22, 27].

#### 9.4.5.1.2 Requirements

The requirements in clause 9.4.2 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.1.3.

#### 9.4.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$  where  $TTI_{DCCH}$  is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

#### 9.4.5.2 NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements

#### 9.4.5.2.1 Introduction

The requirements in clause 9.4.5.2. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN TDD E-CID RSRP and RSRQ measurements [22, 27].

#### 9.4.5.2.2 Requirements

The requirements in clause 9.4.3 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.2.3.

#### 9.4.5.2.3 Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is:  $2 \times TTI_{DCCH}$  where  $TTI_{DCCH}$  is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

## 9.5 L1-RSRP measurements for Reporting

#### 9.5.1 Introduction

When configured by the network, the UE shall be able to perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed for a serving cell, including PCell, PSCell, or SCell, on the resources configured for L1-RSRP measurements within the active BWP.

The UE shall be able to measure all CSI-RS resources and/or SSB resources of the *nzp-CSI-RS-ResourceSet* and/or *csi-SSB-ResourceSet* within the CSI-Resource*Config* settings configured for L1-RSRP for the active BWP, provided that the number of resources does not exceed the UE capability indicated by *beamManagementSSB-CSI-RS*.

The UE shall report the measurement quantity (*reportQuantity*) and send periodic, semi-persistent or aperiodic reports, according to the *reportConfigType* according to the CSI reporting configuration(s) (*CSI-ReportConfig*) for the active BWP.

## 9.5.2 Requirements applicability

The requirements in clause 9.5 apply, provided:

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

An SSB resource configured for L1-RSRP shall be considered measurable when for each relevant SSB the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.1 and 10.1.20.1 for FR1 and FR2, respectively, for a corresponding band,
- SSB\_RP and SSB Ês/Iot according to Annex B.2.4.1 for a corresponding band.

A CSI-RS resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.2 and 10.1.20.2 for FR1 and FR2, respectively, for a corresponding band,
- CSI-RS\_RP and CSI-RS Ês/Iot according to Annex B.2.4.2 for a corresponding band.

A CSI-RS and SSB resource configured for L1-RSRP shall be considered measurable when the measurable resource conditions are met for both CSI-RS resource and SSB resource.

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

## 9.5.3 Measurement Reporting Requirements

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to clause 10.1.19 for FR1 and 10.1.20 for FR2 if *nrofReportedRS* is configured to one. If *nrofReportedRS* is configured to be larger than one, or if *groupBasedBeamReporting* is enabled, the UE shall use differential L1-RSRP based reporting as defined in clause 10.1.19 for FR1 and 10.1.20 for FR2. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in 10.1.6.

#### 9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

#### 9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in a Semi-Persistent L1-RSRP measurement report shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUSCH, if a DCI request has been received.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUCCH, if an activation command [7] has been received.

The UE shall transmit the semi-persistent L1-RSRP reporting on PUSCH or PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

#### 9.5.3.3 Aperiodic Reporting

Reported L1-RSRP measurements contained in aperiodic triggered, aperiodic triggered periodic and aperiodic triggered semi-persistent L1-RSRP reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send aperiodic L1-RSRP measurement reports, if a DCI trigger has been received.

After the UE receives CSI request in DCI, the UE shall transmit the aperiodic L1-RSRP reporting on PUSCH over the air interface at the time specified according to clause 6.1.2.1 in TS 38.214 [26].

## 9.5.4 L1-RSRP measurement requirements

#### 9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of  $T_{L1-RSRP\_Measurement\_Period\_SSB}$ .

The value of  $T_{L1\text{-RSRP\_Measurement\_Period\_SSB}}$  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,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$ , 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 ( $T_{SSB} = T_{SMTCperiod}$ ).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$ , 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
  - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5*T_{SMTCperiod}$
- P is  $\frac{1}{1-\frac{T_{SSB}}{MGRP}}$ \*  $P_{sharing\ factor}$ , 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<sub>sharing factor</sub>, 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 is  $\frac{1}{1-\frac{T_{SSB}}{MGRP}}$ \*  $P_{sharing\ factor}$ , 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 ( $T_{SMTCperiod} < MGRP$ ) $P_{sharing\ factor} = 1$ 
  - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
    consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
    symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
    is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
    carrier, and,
  - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,
- $P_{\text{sharing factor}} = 3$ , otherwise.

#### Where:

 $T_{SSB} = ssb\text{-periodicityServingCell}$ 

 $T_{SMTCperiod}$  = the configured SMTC period

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.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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<sub>L1-RSRP Measurement Period SSB</sub> for FR1

Conf	iguration	T <sub>L1-RSRP_Measurement_Period_SSB</sub> (ms)
no	n-DRX	max(T <sub>Report</sub> , ceil(M*P)*T <sub>SSB</sub> )
DRX cyc	cle ≤ 320ms	max(T <sub>Report</sub> , ceil(1.5*M*P)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))
DRX cy	cle > 320ms	ceil(M*P)*T <sub>DRX</sub>
Note: T <sub>SSB</sub> = ssb-periodicityServingCell is the periodicity of the SSB-Index		
configured for L1-RSRP measurement. TDRX is the DRX cycle length.		
T <sub>Report</sub> is configured periodicity for reporting.		

Table 9.5.4.1-2: Measurement period T<sub>L1-RSRP\_Measurement\_Period\_SSB</sub> for FR2

Configuration	T <sub>L1-RSRP_Measurement_Period_SSB</sub> (ms)
non-DRX	max(T <sub>Report</sub> , ceil(M*P*N)*T <sub>SSB</sub> )
DRX cycle ≤ 320ms	max(T <sub>Report</sub> , ceil(1.5*M*P*N)*max(T <sub>DRX</sub> ,T <sub>SSB</sub> ))
DRX cycle > 320ms	ceil(1.5*M*P*N)*T <sub>DRX</sub>
Note: T <sub>SSB</sub> = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T <sub>DRX</sub> is the DRX cycle length. T <sub>Report</sub> 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<sub>L1-RSRP</sub> 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 ON, N=ceil(*maxNumberRxBeam* / N<sub>res\_per\_set</sub>), where N<sub>res\_per\_set</sub> is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.
  - 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<sub>res\_per\_set</sub>), where N<sub>res\_per\_set</sub> is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for with QCL-TypeD 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<sub>res\_per\_set</sub>), where N<sub>res\_per\_set</sub> is number of resources in the resource set. The requirements apply provided TCI state is provided with QCL-TypeD 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 requirements 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 with QCL-TypeD for all resources in the resource set.

#### For FR1.

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$ , 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.
- $P=\frac{1}{1-\frac{T_{CSI-RS}}{MGRP}}$ , 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 ( $T_{CSI-RS} < T_{SMTCperiod}$ ).
- $P=P_{sharing\ factor}$ , when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ( $T_{CSI-RS} = T_{SMTCperiod}$ ).
- P=1, when aperiodic CSI-RS resource is not overlapped with measurement gap.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$ , when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS <  $T_{SMTCperiod}$ ) and SMTC occasion is not overlapped with measurement gap and
  - $T_{SMTCperiod} \neq MGRP$  or
  - $T_{SMTCperiod} = MGRP$  and  $T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $-P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}, \ \, \text{when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5*T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{\min(T_{SMTCperiod},MGRP)}}$ , when CSI-RS is partially overlapped with measurement gap ( $T_{CSI-RS} < MGRP$ ) and CSI-RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ) and SMTC occasion is partially or
  - CSI-RS is partially overlapped with SMTC occasion ( $T_{CSI-RS} < T_{SMTCperiod}$ ) and SMTC occasion is partially or fully overlapped with measurement gap.
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$ , 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 ( $T_{SMTCperiod} < MGRP$ )
- P<sub>sharing factor</sub> = 1, if the CSI-RS configured for L1-RSRP measurement outside measurement gap is

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured
- $P_{\text{sharing factor}} = 3$ , otherwise.

#### Where:

 $T_{SMTCperiod}$  = the configured SMTC period.

T<sub>CSI-RS</sub> = 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.  $T_{SMTCperiod}$  is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

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<sub>L1-RSRP Measurement Period CSI-RS</sub> for FR1

Conf	iguration	T <sub>L1-RSRP_Measurement_Period_CSI-RS</sub> (ms)
no	n-DRX	max(T <sub>Report</sub> , ceil(M*P)*T <sub>CSI-RS</sub> )
DRX cycle ≤ 320ms		max(T <sub>Report</sub> , ceil(1.5*M*P)*max(T <sub>DRX</sub> ,T <sub>CSI-RS</sub> ))
DRX cy	cle > 320ms	ceil(M*P)*T <sub>DRX</sub>
Note 1:		periodicity of CSI-RS configured for L1-RSRP t. T <sub>DRX</sub> is the DRX cycle length. T <sub>Report</sub> is configured
Note 2:	periodicity for reporting.	

Table 9.5.4.2-2: Measurement period T<sub>L1-RSRP Measurement Period CSI-RS</sub> for FR2

Conf	iguration	T <sub>L1-RSRP_Measurement_Period_CSI-RS</sub> (ms)
nc	n-DRX	max(T <sub>Report</sub> , ceil(M*P*N)*T <sub>CSI-RS</sub> )
DRX cyc	cle ≤ 320ms	max(T <sub>Report</sub> , ceil(1.5*M*P*N)*max(T <sub>DRX</sub> ,T <sub>CSI-RS</sub> ))
DRX cy	cle > 320ms	ceil(M*P*N)*T <sub>DRX</sub>
Note 1:		periodicity of CSI-RS configured for L1-RSRP
Note 2:	measurement. $T_{DRX}$ is the DRX cycle length. $T_{Report}$ is configured periodicity for reporting. the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3.	

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

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

#### 9.5.5.1 Measurement restriction for SSB based L1-RSRP

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

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
- If SSB and CSI-RS have different SCS,
  - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
  - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

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

#### 9.5.5.2 Measurement restriction for CSI-RS based L1-RSRP

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

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

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

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

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

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

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

- In the following cases, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and the
  other CSI-RS. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no
  requirements are defined.
  - The CSI-RS for L1-RSRP measurement or the other CSI-RS in a resource set configured with repetition ON, or
  - The other CSI-RS is configured in q1 and beam failure is detected, or
  - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,

- Otherwise, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

## 9.5.6 Scheduling availability of UE during L1-RSRP measurement

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

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

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

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

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

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured 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 9.5.4.2
  - 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
  - symbols corresponding to the SSB indexes configured for L1-RSRP measurement, and/or
  - symbols corresponding to the periodic CSI-RS resource configured for L1-RSRP measurement, and/or
  - symbols corresponding to the semi-perssitent CSI-RS resource configured for L1-RSRP measurement when the resource is activated, and/or
  - symbols corresponding to the aperiodic CSI-RS resource configured for L1-RSRP measurement when the reporting is triggered.

When intra-band carrier aggregation is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the band on the symbols that fully or partially overlap with restricted symbols.

If following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

# 9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

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

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

### 9.6 NE-DC: Measurements

#### 9.6.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA FDD or TDD PSCell. The requirements apply to UEs that have been configured with NE-DC.

#### 9.6.2 SFTD Measurements

#### 9.6.2.1 Introduction

This clause contains requirements on UE capabilities for reporting of SFN and frame time difference between NR PCell and E-UTRA PSCell in RRC\_CONNECTED state. The requirements comprise measurement reporting delay and measurement accuracy. The overall measurement reporting delay includes a RRC procedure delay specified in TS 38.331 [2], and the SFTD measurement reporting delay specified below.

#### 9.6.2.2 SFTD Measurement requirements

When no DRX is used in either of the NR PCell and E-UTRA PSCell, the physical layer measurement period of the SFTD measurement shall be  $T_{measure\_SFTD1} = max(0.2, 5 * SMTC period)$  s.

When DRX is used in either of the NR PCell or the E-UTRA PSCell, or in both PCell and PSCell, the physical layer measurement period ( $T_{measure\_SFTD1}$ ) of the SFTD measurement shall be as specified in Table 9.6.2.2-1.

Table 9.6.2.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) <sup>Note2</sup>	Tmeasure_SFTD1 (S)
DRX cycle≤0.04	max(0.2,5 x SMTC period) (Note1)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" th=""><th>5 x DRX cycle</th></drx>	5 x DRX cycle
Note2: DRX cycle length in this table 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

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 (T<sub>measure SFTD2</sub>), and

T<sub>PSCell change NEDC</sub> 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,
- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

## 10.1.2 Intra-frequency RSRP accuracy requirements for FR1

## 10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

## 10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accı	ıracy			Condition			
Normal	Extreme	SSB		lo <sup>Note</sup>	<sup>1</sup> range		
condition	condition	Ês/lot	NR operating band groups Note 2				Maximum lo
		dB		dBm/S	CS <sub>SSB</sub>		
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			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_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: 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 EP1

The accuracy requirements in Table 10.1.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accı	ıracy			Condit	ions		
Normal	Extreme	SSB		lo <sup>N</sup>	lote 1 range		
condition	condition	Ês/lot Note 2	NR operating band groups Note 4		Minimum	lo	Maximum lo
		dB		dBm /	SCS <sub>SSB</sub>		
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			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 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	lo <sup>Note 2</sup> range				
condition	condition	Ês/lot		Minimum	lo	Maximum Io	
			dBm / SC	Sss Note 1			
dB	dB	dB	SCS <sub>SSB</sub> = SCS <sub>SSB</sub> = 120kHz 240kHz		dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>	
			Same value as SSB_RP				
±6	±9	≥-6	in Table B.2.2-2,		N/A	-70	
			according to	o UE Power			

			class, operating band and angle of arrival			
±8	±11		N/A	-70	-50	
Note 1:	Values based or	n Refsens and	EIS spherical coverage as o	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 bas	eband is abov	e the value defined in this ta	ble.		

### 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

Accı	uracy		Co	nditions	
Normal	Extreme	SSB		lo <sup>Note 2</sup> rai	nge
condition	condition	Ês/lot	Minim	um lo	Maximum lo
			dBm / SC	S <sub>SSB</sub> Note 1	
dB	dB	dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>
±6	±9	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		in Table ecording to er class, band and	-50
С	alues based o lauses 7.3.2 ar elected depend	nd 7.3.4 of TS	38.101-2 [19]		
a	cross the band	lwidth.	•		e constant EPRE
a	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.				
	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 SS				Condit					
Normal	Extreme	SSB	lo Note 1 range						
condition	condition	Ês/lot NR operating band groups Note 3			Minimum Io				
		dB		dBm /	SCS <sub>SSB</sub>				
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>		
			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_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50		

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 |  $\leq$  20 dB

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

Accı	ıracy		Conditions				
Normal	Evtromo	SSB		lo <sup>Note 1</sup> range	lo Note 1 range		
condition	Extreme condition	Ês/lot Note 2	NR operating band groups Minimum Io Maximum			Maximum lo	
dB	dB	dB	dBm / SCS <sub>SSB</sub> dBm/BW <sub>Channel</sub> dBm/B				

				SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	N/A	-50
±4.5	±6	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

#### 10.1.4.2 Void

## 10.1.5 Inter-frequency RSRP accuracy requirements for FR2

### 10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

#### 10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	ıracy		Conditions						
Normal	Extreme	SSB		I	o <sup>Note 2</sup> range				
condition	condition	Ês/lot		Minimum	lo	Maximum lo			
			dBm / SCS <sub>SSB</sub> Note 1 SCS <sub>SSB</sub> = SCS <sub>SSB</sub> = 120kHz 240kHz						
dB	dB	dB			dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>			
			Same value	as SSB_RP					
			in Table						
±6	±9	≥-4	according to UE Power		N/A	-70			
			2-4	class, operating band					
			and angle of arrival						
±8	±11		N/	/A	-70	-50			

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Es/lot and related parameters may need to be adjusted to ensure Es/lot at UE baseband is above the value defined in this table.

#### 10.1.5.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell on a frequency in FR2 compared to the SS-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27dB$
- | Channel 1\_Io -Channel 2\_Io |  $\leq$  20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accı	ıracy		Co	nditions		
Normal	Extreme	SSB		lo Note 2 range	е	
condition	condition	Ês/lot	Minimum Io		Maximum Io	
			dBm / SCS <sub>SSB</sub> Note 1			
dB	dB	dB	SCS <sub>SSB</sub> =	SCS <sub>SSB</sub> =	dBm/BW <sub>Channel</sub>	
			120kHz	240kHz		
			Same value a	s SSB_RP in		
±6	±9	≥-4		Table B.2.3-2, according to		
	19	2-4	UE Power class, operating		-50	
			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		<b>^</b>			
					may need to be	
	adjusted to ensure Ês/lot at UE baseband is above the value defined in					
_	his table.			000 6 "		
				SSB Es/lot of t	the pair of cells to	
\\	which the req	uirement app	lies.			

#### 10.1.5.2 Void

## 10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting is defined from 0 dBm to -30 dB with 2 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.6.1-1: SS-RSRP and CSI-RSRP measurement report mapping

Reported value	Measured quantity value (L3 SS-RSRP)	Measured quantity value (L1 SS-RSRP and	Unit
	,	CSI-RSRP)	

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	Infinity	Infinity	dBm				
(Note) Note: The value	Lue of RSRP_127 is applicate	l ble for RSRP threshold config	ured				
by the network as defined in TS 38.331 [2], but not for the purpose of							

measurement reporting.

Table 10.1.6.1-2: Differential SS-RSRP and CSI-RSRP measurement (for L1 reporting) report mapping

Reported value	Measured quantity value (difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0 ≥ △ RSRP>-2	dB

DIFFRSRP_1	-2≥ ∆ RSRP>-4	dB
DIFFRSRP_2	-4≥ ∆ RSRP>-6	dB
DIFFRSRP_3	-6≥ ∆ RSRP>-8	dB
DIFFRSRP_4	-8 ≥ ∆ RSRP>-10	dB
DIFFRSRP_5	-10 ≥ ∆ RSRP>-12	dB
DIFFRSRP_6	-12≫ ∆ RSRP>-14	dB
DIFFRSRP_7	-14≥ ∆ RSRP>-16	dB
DIFFRSRP_8	-16 ≥ △ RSRP>-18	dB
DIFFRSRP_9	-18 ≥ △ RSRP>-20	dB
DIFFRSRP_10	-20 ≥ ∆ RSRP>-22	dB
DIFFRSRP_11	-22≥ △ RSRP>-24	dB
DIFFRSRP_12	-24≥ △ RSRP>-26	dB
DIFFRSRP_13	-26 ≥ △ RSRP>-28	dB
DIFFRSRP_14	-28 ≥ △ RSRP>-30	dB
DIFFRSRP_15	-30≥ ∆ RSRP	dB

## 10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

### 10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

### 10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.7.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

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

Accı	ıracy	Conditions						
Normal Extreme condition		SSB	lo <sup>Note 1</sup> range					
		Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum Io	
		dB		dBm /	SCS <sub>SSB</sub>			
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
		±4 ≥-3 dB	NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±2.5	±4		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3.5	<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: 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

Accı	ıracy			Conditions		
Normal	Extreme	SSB		lo Note 2 range		
condition	condition	Ês/lot	Minim	um lo	Maximum Io	
	dB		dBm / SC	dBm / SCS <sub>SSB</sub> Note 1		
dB		dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>	
±2.5	±4	<b>≥-3</b>		Same value as SSB_RP in Table B.2.2-2, according to UE Power		
±3.5	±4	≥-6	class, operating ba arrival	-50		

- Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.
- Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

## 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

Accuracy Conditions	
	lo <sup>Note 1</sup> range

Normal condition	Extreme condition	SSB Ês/lot	NR operating band groups Note 3	Minimum Io			Maximum Io
		dB		dBm /	dBm / SCS <sub>SSB</sub>		
dB	IB dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			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	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in 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.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1\_Io -Channel 2\_Io |  $\leq$  20 dB

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

Accı	ıracy	Conditions					
Normal Extreme		SSB		lo <sup>Note 1</sup> range			
condition			NR operating band groups Note 4		Minimum Io		
		dB		dBm /	SCS <sub>SSB</sub>		
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			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.

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.

## 10.1.10 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].

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

Accı	ıracy		Conditions								
Normal	Extreme	SSB		lo <sup>Note 2</sup> rang	je						
condition	condition	Ês/lot	Minim	um lo	Maximum Io						
			dBm / SCS <sub>SSB</sub> Note 1								
dB	dB	dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>						
±2.5	±4	≥-3	Same value as SS B.2.2-2, according	_	-50						
±3.5	±4	≥-4	class, operating ba	and and angle of	-30						
Note 1: V	alues based or	n Refsens and	d EIS spherical cover	Note 1: Values based on Refsens and EIS spherical coverage as 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.

#### 10.1.10.1.2 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.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | 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

Accuracy	Conditions
Accuracy	Conditions

Normal	Extreme	SSB	lo <sup>Note 2</sup> range				
conditio	n condition	Ês/lot	Minim	num lo	Maximum Io		
			dBm / SC	S <sub>SSB</sub> Note 1			
dB	dB dB dB		SCS <sub>SSB</sub> = SCS <sub>SSB</sub> = 240kHz		dBm/BW <sub>Channel</sub>		
±3	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±4	±4	≥-4	class, operating ba arrival	and and angle of	-50		
Note 1:					auses 7.3.2 and 7.3.4 of		
				ed depending on an			
Note 2:	Io specified at the	ne Reference p	point, and assumed	to have constant EF	PRE across the bandwidth.		
Note 3:	The parameter \$	SSB Ês/lot is t	he minimum SSB Ê	s/lot of the pair of ce	ells to which the		
	requirement app	olies.					
Note 4: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.							

## 10.1.11 RSRQ report mapping

## 10.1.11.1 SS-RSRQ measurement report mapping

Reported value

SS-RSRQ\_122

SS-RSRQ\_123

SS-RSRQ\_124

SS-RSRQ\_125

SS-RSRQ\_126

SS-RSRQ\_127

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.

value dΒ SS-RSRQ\_0 SS-RSRQ<-43 -43 ≤ SS-RSRQ<-42.5 SS-RSRQ\_1 dB -42.5≤ SS-RSRQ<-42 SS-RSRQ\_2 dB SS-RSRQ\_3 -42 ≤ SS-RSRQ<-41.5 dΒ -41.5≤ SS-RSRQ<-41 SS-RSRQ\_4 dΒ . . .

17.5≤ SS-RSRQ<18

18≤ SS-RSRQ<18.5

18.5 ≤ SS-RSRQ<19

19≤ SS-RSRQ<19.5

19.5 ≤ SS-RSRQ<20

 $20 \leq SS\text{-RSRQ}$ 

Table 10.1.11.1-1: SS-RSRQ measurement report mapping

Measured quantity

Unit

dΒ

dB

dB

dΒ

dB

dΒ

# 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			Condi				
Normal	Extreme	SSB	lo Note 1 range					
condition condition		Ês/lot Note 3	NR operating band groups Note 4		Minimum Io			
		dB		dBm /	SCS <sub>SSB</sub>			
dB dB				SCS <sub>SSB</sub> = SCS <sub>SSB</sub> = 30 kHz		dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>	
			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 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

Accı	uracy		Conditions					
Normal	Extreme	SSB		lo <sup>Note 2</sup> rang	e			
condition	condition	Ês/lot	Minim	um lo	Maximum lo			
			dBm / SCS <sub>SSB</sub> Note 1					
dB	dB	dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>			
±3	±4	≥-3	Same value as SS B.2.2-2, according	50				
±3.5	±4	≥-6	class, operating band and angle of arrival		-50			
Note 1: V	alues based o	n Refsens and	d FIS spherical cover	rage as defined in cl	auses 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 or 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 £s/lot and related parameters may need to be adjusted to ensure

Ês/lot at UE baseband is above the value defined in this table.

Note 4: The requirements apply for SSB 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	Conditions							
Normal	Extreme	SSB	SSB Io Note 1 range						
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum	lo	Maximum lo		
		dB		dBm /	SCS <sub>SSB</sub>				
dB dB				SCS <sub>SSB</sub> = SCS <sub>SSB</sub> = 15 kHz 30 kHz		dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>		
			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	±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  $\hat{E}$ s/lot  $\leq$  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.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | 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								
Normal	Extreme	SSB		Io <sup>Note 1</sup> range							
condition	condition	Ês/lot Note 2,4	NR operating band groups <sup>Note 5</sup>		Minimum	lo	Maximum Io				
		dB		dBm / S	SCS <sub>SSB</sub>						
dB dB	dB			SCS <sub>SSB</sub> = 120 kHz	SCS <sub>SSB</sub> = 240 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>				
			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	±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 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 4: The requirements apply for SSB Ês/lot ≤ 25 dB.

NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.

## 10.1.15 Inter-frequency SINR accuracy requirements for FR2

#### 10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

### 10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accuracy			Conditions					
Normal	Extreme	SSB		lo <sup>Note 2</sup> rang	je			
condition	condition	Ês/lot		num lo	Maximum Io			
			dBm / SC	S <sub>SSB</sub> Note 1				
dB	dB	dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>			
±3	±4	≥-3	Same value as SS B.2.2-2, according		-50			
±3.5	±4	≥-4	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: 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.
Note 4:	The requirements apply for SSB $\hat{E}$ s/lot $\leq$ 25 dB.

#### 10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR2 compared to the SS-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1\_Io -Channel 2\_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accuracy		Conditions					
Normal Extreme		SSB		lo <sup>Note 2</sup> rang	e		
condition	condition	Ês/lot		um lo	Maximum Io		
			dBm/SC	S <sub>SSB</sub> Note 1			
dB	dB	dB	SCS <sub>SSB</sub> = 120kHz	SCS <sub>SSB</sub> = 240kHz	dBm/BW <sub>Channel</sub>		
±3.5	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
<u>±</u> 4	±4	≥-6	class, operating ba arrival	and angle of	-50		
Note 1: V	alues based or	n Refsens and	EIS spherical cover	rage as defined in cl	auses 7.3.2 and 7.3.4 of		
			side condition select				
					PRE 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		
	equirement app						
	Note 4: In the test cases, the SSB Es/lot and related parameters may need to be adjusted to ensure						
			e the value defined	in this table.			
Note 5: T	he requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.				

## 10.1.16 SINR report mapping

#### 10.1.16.1 SS-SINR measurement report mapping

The reporting range of SS-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR measurement report mapping

Reported value	Measured quantity value	Unit
SS-SINR_0	SS-SINR<-23	dB
SS-SINR_1	-23≤ SS-SINR<-22.5	dB
SS-SINR_2	-22.5≤ SS-SINR<-22	dB
SS-SINR_3	-22≤ SS-SINR<-21.5	dB
SS-SINR_4	-21.5≤ SS-SINR<-21	dB

SS-SINR_123	38≤ SS-SINR<38.5	dB
SS-SINR_124	38.5≤ SS-SINR<39	dB
SS-SINR_125	39≤ SS-SINR<39.5	dB
SS-SINR_126	39.5≤ SS-SINR<40	dB
SS-SINR_127	40≤ SS-SINR	dB

#### 10.1.17 Power Headroom

## 10.1.17.1 Power Headroom Report

#### 10.1.17.1.1 Power Headroom Report Mapping

POWER\_HEADROOM\_63

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Reported value Measured quantity value (dB) POWER\_HEADROOM\_0 PH < -32POWER\_HEADROOM\_1 -32 ≤ PH < -31 POWER\_HEADROOM\_2 -31 ≤ PH < -30 POWER HEADROOM 3 -30 ≤ PH < -29 20 ≤ PH < 21 POWER\_HEADROOM\_53 POWER\_HEADROOM\_54  $21 \le PH < 22$ POWER\_HEADROOM\_55  $22 \le PH < 24$ POWER\_HEADROOM\_56  $24 \le PH < 26$ POWER\_HEADROOM\_57  $26 \le PH < 28$ POWER\_HEADROOM\_58  $28 \le PH < 30$ POWER HEADROOM 59  $30 \le PH < 32$ POWER\_HEADROOM\_60  $32 \le PH < 34$ POWER\_HEADROOM\_61  $34 \le PH < 36$ POWER\_HEADROOM\_62  $36 \le PH < 38$ 

Table 10.1.17.1-1: Power headroom report mapping

## 10.1.18 P<sub>CMAX,c,f</sub>

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.

PH ≥ 38

#### 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.

Reported value	Measured quantity value	Unit
PCMAX_C_00	P <sub>CMAX,c,f</sub> < -29	dBm
PCMAX_C_01	$-29 \le P_{CMAX,c,f} < -28$	dBm
PCMAX_C_02	$-28 \le P_{CMAX,c,f} < -27$	dBm
	•••	
PCMAX_C_61	$31 \le P_{CMAX,c,f} < 32$	dBm
PCMAX_C_62	$32 \le P_{CMAX,c,f} < 33$	dBm
PCMAX_C_63	$33 \le P_{CMAX,c,f}$	dBm

Table 10.1.18.1-1 Mapping of P<sub>CMAX,c.f</sub>

## 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

Accuracy		Conditions							
Normal	Extreme	SSB		lo	Note 1 range				
condition	condition	Ês/lot	NR operating band groups Note 2		Minimum	lo	Maximum Io		
		dB		dBm /	SCS <sub>SSB</sub>				
dB	dB			SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>		
			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		
		9.5 ≥-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_B, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_B,	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.

#### 10.1.19.1.2 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 condition		SSB	SSB Io Note 1 range							
		Ês/lot Note 2	NR operating band groups Note 4		Minimum	lo	Maximum lo			
				dBm /	SCS <sub>SSB</sub>					
dB	dB	dB		SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
		±4 ≥-3dB	NR_FDD_FR1_B	-120.5	-117.5	N/A	-50			
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±3	±4		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			

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	Accuracy		Conditions							
Normal	Extreme	CSI-	CSI- Io Note 1 range							
condition	condition	RS Ês/lot	NR operating band groups <sup>Note 2</sup>	NR operating band groups Note 2 Minimum Io						
					m / SCS <sub>CSI-RS</sub>					
dB	dB	dB		SCS <sub>CSI-</sub> RS = 15 kHz	SCS <sub>CSI-</sub> RS = 30 kHz	SCS <sub>CSI-</sub> RS = 60 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-70		
±5.0	±9.5	≥-3dB	NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	-114	N/A	-70		
			NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-70		

			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-70
			NR_FDD_FR1_G	-118	-115	-112	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-70
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	N/A	-70	-50

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

### 10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

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

Accuracy			Conditions						
	CSI-		Io Note 1 range						
Normal condition	Extreme condition	RS Ês/lot Note 2	NR operating band groups Note 4	Minimum Io Maximum			Maximum lo		
		dB		dB	m / SCScs	SI-RS			
dB	dB			SCS <sub>CSI-</sub> RS = 15 kHz	SCS <sub>CSI-</sub> RS = 30 kHz	SCS <sub>CSI-</sub> RS = 60 kHz	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>	
			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	±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 <sup>Note 1</sup> range		
condition	condition	Ês/lot		Minimum	lo	Maximum Io
			dBm / SC	Sss Note 2		
dB	dB	dB	SCS <sub>SSB</sub> =	SCS <sub>SSB</sub> =	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			120kHz	240kHz		
			Same value	as SSB_RP		
			in Table I			
±6.5	±9.5	≥-3	according to	o UE Power	N/A	-70
			class, operating band			
			and angle	of arrival		
±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 Es/lot and related parameters may need to be adjusted to ensure Es/lot at UE baseband is above the value defined in this table.

#### 10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.20.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

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

Accuracy		Conditions				
Normal	Extreme	SSB	lo <sup>Note 1</sup> range			
condition	condition	Ês/lot	Minimum Io		Maximum Io	
			dBm / SC			
dB	dB	dB	SCS <sub>SSB</sub> =	SCS <sub>SSB</sub> =	dBm/BW <sub>Channel</sub>	
			120kHz	240kHz		

±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	-50			
NOTE 1:			ce point, and assumed to have	constant EPRE			
	across the ba						
NOTE 2:	The parameter	er SSB Ês/lot	is the minimum SSB Ês/lot of t	the pair of SSBs			
	to which the r			•			
NOTE 3:			and EIS spherical coverage as	defined in			
1.10.20.	clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition						
				ac contaition			
NOTE 4.	selected depending on angle of arrival.						
NOTE 4:	In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in						
	•	nsure Es/lot a	at UE baseband is above the va	llue defined in			
	this table.						

### 10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

#### 10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 are valid under the following conditions:

- Conditions 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	Accuracy Conditions					
Normal	Extreme	CSI-RS		I	o <sup>Note 1</sup> range	
condition	condition	Ês/lot		Minimum	lo	Maximum lo
			dBm / SCS	SCSI-RS Note 2		
dB	dB	dB	SCS <sub>CSI-RS</sub>	SCS <sub>CSI-RS</sub>	dBm/BW <sub>Channel</sub>	dBm/BW <sub>Channel</sub>
			= 60kHz	= 120kHz		
				ue as CSI-		
±6.5	±9.5	≥-3	2, accord	able B.2.4.2-	N/A	-70
10.0	10.0	_ 3	Power class	s, operating	14// (	70
±8.5	±11.5	≥-3	N,		-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	Conditions					
Normal	Extreme	CSI-RS		lo Note 1 range	е		
condition	condition	Ês/lot	Minim	ium lo	Maximum Io		
			dBm/S	CS <sub>CSI-RS</sub>			
dB	dB	dB	SCS <sub>CSI-RS</sub> =	SCScsi-Rs =	dBm/BW <sub>Channel</sub>		
			60kHz	120kHz			
			Same value a	as CSI-RS RP			
			in Table I	3.2.4.2-2,			
±6.5	±9.5	≥-3	according to	o UE Power	-50		
			class, operat	ing band and			
			angle of arrival				
NOTE 1: Io specified at the Reference point, and 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: 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 4: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

## 10.1.21 SFTD accuracy requirements

#### 10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell lo range conditions in FR1

	lo <sup>Note 1</sup> range						
	NR operating band groups Note 4, 5	Minimun	ı lo <sup>Note 2, 3</sup>	Maximum lo			
Parameter		dBm/	dBm/ SCS <sub>SSB</sub>				
		SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>			
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50			
Conditions	NR_FDD_FR1_B	-120.5	-117.5	-50			
Conditions	NR_TDD_FR1_C	-120	-117	-50			
	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<sub>IB,c</sub> as defined in clause 7.3B in TS 38.101-3 [20], 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 [20], 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 [20] 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

		lo <sup>Note 1</sup> range				
Parameter	Minimum	No Note 2, 3	Maximum lo			
Farailletei	dBm/ \$	dBm/ SCS <sub>SSB</sub>				
	SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	dBm/BW <sub>Channel</sub>			
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50			

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.
- NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

#### For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- $RSRP|_{dBm}$  according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.
- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell lo range conditions

Doromotor	lo <sup>Note 1</sup> range					
Parameter -	E-UTRA operating band groups Note 3	Minimum Io	Maximum Io			
		dBm/15kHz Note 2	dBm/BW <sub>Channel</sub>			
	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  $\Delta$ >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 dD	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 <sup>Note 1</sup> range								
	NR operating band groups Note 2	Minim	Maximum Io						
Parameter		dBm/ SCS <sub>SSB</sub>							
		SCS <sub>SSB</sub> = 15	SCS <sub>SSB</sub> = 30	dBm/BW <sub>Channel</sub>					
		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: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups are as defined in clause 3.5.2.

For FR2 PSCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.2-2: PSCell lo range conditions in FR2

	lo <sup>Note 1</sup> range						
Parameter	Minimum	Maximum Io					
Farailleter	dBm/ \$	SCS <sub>SSB</sub>	dBm/BW <sub>Channel</sub>				
	SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 30 kHz	CIDITI/ 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	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	ng unit defined in TS 38.2	11 [6].			
NOTE 2: The parameter Ês/lot 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 <sub>SSB</sub>				
		SCS <sub>SSB</sub> = 15	SCS <sub>SSB</sub> = 30	dBm/BW <sub>Channel</sub>			
		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 c	operating hand groups are as defined in clause 3	152					

- 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

	Minimum	Maximum Io					
	dBm/	dPm/PW					
	SCS <sub>SSB</sub> = 15 kHz SCS <sub>SSB</sub>		dBm/BW <sub>Channel</sub>				
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				
	is assumed to have constant EPRE acro						
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: 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.						

## 10.2 E-UTRAN measurements

### 10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC or NE-DC operation mode.

The requirements in clause 10.2 are applicable for a UE:

- in RRC\_CONNECTED state
- performing measurements with appropriate measurement gaps according to clause 9.1.2.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

#### 10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

#### 10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

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

### 10.2.4 E-UTRAN RSTD measurements

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

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR — E-UTRAN FDD and inter-RAT NR — E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC\_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

#### 10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC\_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC\_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

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

## 11 Void

# 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.6.1 and A.7.1) 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 $\sigma$  if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

## 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	Defined in test case						
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		2			
symbols					
PDSCH mapping type		Type A			
Information Bit Payload					
For slots with RMSI Note 2	bits	1608			
For slots without RMSI	bits	1864			
Number of Code Blocks per slot		1			
Binary Channel Bits Per slot					
For slots with RMSI Note 2, Note 4	bits	5184			
For slots without RMSI	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: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-lnactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

#### 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	SR.1.2 TDD			
Channel bandwidth	MHz	Defined in test case	Defined in test case			
Number of transmitter antennas		1	1			
Allocated resource blocks for PDSCH Note 1		24	24			
Allocated slots per Radio Frame						
Radio frame containing SSB	slots	Note 5	Note 5			
Radio frame not containing SSB	slots	4	6			

						1
MCS table		64QAM	64QAM			
MCS index		4	4			
Modulation		QPSK	QPSK			
Target Coding Rate		1/3	1/3			
Number of control symbols		2	2			
PDSCH mapping type		Type A	Type A			
Information Bit Payload						
For slots with RMSI Note 2	bits	1608	1608			
For slots without RMSI	bits	1864	1864			
For special slots	bits	N/A	1128			
Number of Code Blocks		1	1			
per slot						
Binary Channel Bits Per slot						
For slots with RMSI Note 2, Note 4	bits	5184	5184			
For slots without RMSI	bits	6048	6048			
For special slots Note 6	bits	-	3744			

- 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: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: 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 7: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-lnactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for SCS=30kHz

Parameter	Unit		Value
Reference channel		SR.2.1 TDD	
Channel bandwidth	MHz	Defined in test case	
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	1608			
For slots without RMSI	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: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: 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 7: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-InactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for SCS=120kHz

Parameter	Unit				Value
Reference channel		SR.3.1	SR.3.2	SR.3.3	
		TDD	TDD	TDD	
Channel bandwidth	MHz	100	100	100	
Number of transmitter		1	1	1	
antennas					
Allocated resource blocks		24 Note 1	24 <sup>Note 7</sup>	48 <sup>Note 7</sup>	
for PDSCH					
Allocated slots per Radio					
Frame					
Radio frame containing	slots	Note 5	Note 5	Note 5	
SSB					
Radio frame not	slots	48	48	48	
containing SSB					
MCS table		64QAM	64QAM	64QAM	
MCS index		4	4	4	
Modulation		QPSK	QPSK	QPSK	
Target Coding Rate		1/3	1/3	1/3	
Number of control		2	2	2	
symbols					
PDSCH mapping type		Type A	Type A	Type A	
Information Bit Payload					
For slots with RMSI	bits	1608	1608	3104	
For slots without RMSI	bits	1864	1864	3624	
Number of Code Blocks		1	1	1	
per slot					
Binary Channel Bits Per					
slot					

For slots	with RMSI Note 4	bits	5184	5184	10368				
For slots	s without RMSI	bits	6048	6048	12096				
Note 1: Note 2:									CH block
Note 3:								on. The	
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: 2.								
Note 5:	5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.								
Note 6:	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 7: Note 8:	Allocated in the same resource blocks as the CORESET.  When DRX is configured, PDSCH is scheduled only while drx-onDurationTimer is running, unless otherwise specified in the test case.								

# 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	Defined in test case	
Subcarrier spacing for RMSI CORESET	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
Subcarrier spacing for SSB	kHz	15	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note8)	
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	ΓS 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	Defined in test case	
Subcarrier spacing	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

Parameter	Unit		Value		
Reference channel		CR.2.1 TDD			
Channel bandwidth	MHz	Defined in test case			
Subcarrier spacing	kHz	30			
Allocated resource blocks for RMSI CORESET Note 7		24			
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1			
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)			
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4			
Number of transmitter antennas		1			
Duration of RMSI CORESET Note 7	symbols	2			
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder granularity		6			
REG bundle size		6			
Mapping from REG to CCE		Distributed			
Cell ID		Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

Parameter	Unit			٧	'alue		
Reference channel		CR.3.1	CR.3.2				
		TDD	TDD				
Channel bandwidth	MHz	100	100				
Subcarrier spacing	kHz	120	120				
Allocated resource		24 Note 7	48 Note 9				
blocks for RMSI							
CORESET							
SSB and RMSI		Pattern 1	Pattern 1				
CORESET multiplexing		Note 7	Note 9				
configuration							
Offset between SSB and	RB	0 (Note 8)	0 (Note 8)				
RMSI CORESET Note 3		Note 7	Note 9				

Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	Index 4			
Number of transmitter antennas		1	1			
Duration of RMSI CORESET	symbols	2 Note 7	2 Note 9			
DCI Format Note 1		Note 2	Note 2			
Aggregation level	CCE	8	8			
DMRS precoder granularity		6	6			
REG bundle size		6	6			
Mapping from REG to CCE		Distributed	Distributed			
Cell ID		Note 5	Note 5			
Payload (without CRC)	bits	Note 6	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.
- Note 9: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 2 in Table 13-10 in TS 38.213 [3].

# A.3.1.3 CORESET for RMC scheduling

#### A.3.1.3.1 FDD

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

Parameter	Unit		Value							
Reference channel		CCR.1.1	CCR.1.2	CCR.1.3	CCR.1.4					
		FDD	FDD	FDD	FDD					
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in					
		test case	test case	test case	test case					
Subcarrier spacing	kHz	15	15	15	15					
Allocated resource blocks for CORESET Note 3		24	18	24	18					
Number of transmitter		1	1	1	1					
antennas										
Duration of CORESET	symbols	2	2	2	2					
REG bundle size		6	6	6	6					
DMRS precoder granularity		Same as REG	Same as REG	Same as REG	Same as REG					
		bundle	bundle	bundle	bundle					
		size	size	size	size					
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved					
Interleave n_shift		0	0	0	0					
Interleave size		2	2	2	2					

Beamforming Pre- Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

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

### A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

Parameter	Unit			Valu	ie		
Reference channel		CCR.1.1	CCR.1.2	CCR.1.3	CCR.1.4		
		TDD	TDD	TDD	TDD		<u> </u>
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		<u> </u>
Subcarrier spacing	kHz	15	15	15	15		<u></u>
Allocated resource blocks for CORESET		24	18	24	18		
Note 3							
Number of transmitter		1	1	1	1		
antennas							<u></u>
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
		Same as	Same as	Same as	Same as		
DMRS precoder		REG	REG	REG	REG		
granularity		bundle	bundle	bundle	bundle		
		size	size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		<u> </u>
Beamforming Pre-		N/A	N/A	N/A	N/A		
Coder							
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

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

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

Parameter	Unit			V	alue		
Reference channel		CCR.2.1	CCR.2.2	CCR.2.3	CCR.2.4		
		TDD	TDD	TDD	TDD		
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		
Subcarrier spacing	kHz	30	30	30	30		
Allocated resource blocks for CORESET Note 3		24	24	18	18		
Number of transmitter antennas		1	1	1	1		

Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
DMRS precoder		Same as REG	Same as REG	Same as REG	Same as REG		
granularity		bundle size		bundle	bundle		
			size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		
Beamforming Pre- Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	8	4	2		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

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

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

Parameter	Unit				Value			
Reference channel		CCR.3.1	CCR.3.2	CCR.3.3	CCR.3.4	CCR.3.5	CCR.3.6	CCR.3.7
		TDD	TDD	TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz	100	100	100	100	100	100	100
Subcarrier spacing	kHz	120	120	120	120	120	120	120
Allocated resource blocks for CORESET Note 3		24	24	24	24	24	24	48
Number of transmitter antennas		1	1	1	1	1	1	1
monitoringSlotPeriodicityAndOffset		sl160	sl160	sl160	sl160	sl160	sl160	sl160
Note 4		0	0	80	0	0	80	0
monitoringSymbolsWithinSlot		1100000	0011000	1100000	1000000	0010000	1000000	1100000
		0000000	0000000	0000000	0000000	0000000	0000000	0000000
Duration of CORESET	slot	1	1	1	2	2	2	1
REG bundle size		6	6	6	6	6	6	6
		Same as	Same as	Same as	Same as	Same as	Same as	Same as
DMRS precoder granularity		REG	REG	REG	REG	REG	REG	REG
Divino precoder grandianty		bundle size	bundle	bundle	bundle	bundle size	bundle size	bundle
			size	size	size			size
CCE to REG mapping		Interleaved	Interleave	Interleave	Interleave	Interleaved	Interleaved	Interleav
CCL to REG mapping			d	d	d			ed
Interleave n_shift		0	0	0	0	0	0	0
Interleave size		2	2	2	2	2	2	2
Beamforming Pre-Coder		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aggregation level	CCE	4	4	4	8	8	8	4
DCI formats		Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

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

Note 4: monitoringSlotPeriodicityAndOffet is set to "sl1 0" if it is specifically stated that cell(s) configured with one of the control channel RMCs above shall transmit PDCCHs continuously.

# 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 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'	
dI-UL-	ms	1	
TransmissionPeriodicity			
nrofDownlinkSlots		2	
nrofDownlinkSymbols		0	
nrofUplinkSlot		0	
nrofÜplinkSymbols		0	
Note 1: As specified in TS 38.213	3 [3] and TS 3	38.331 [2].	

Note 2: For information

Table A.3.1.4-3: TDD UL/DL configuration for SCS=120kHz

Parameter	Unit		Value	
Reference channel		TDDConf.3.1		
referenceSubcarrierSpacing	kHz	120		
TDD UL/DL pattern 1 Note 2		'DDDSU'		

		S='10DL:2GP:2UL'		
dl-UL-	ms	0.625		
TransmissionPeriodicity				
nrofDownlinkSlots		3		
nrofDownlinkSymbols		10		
nrofUplinkSlot		1		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		Not configured		
dl-UL-	ms	Not configured		
TransmissionPeriodicity				
nrofDownlinkSlots		Not configured		
nrofDownlinkSymbols		Not configured		
nrofUplinkSlot		Not configured		
nrofUplinkSymbols		Not configured		

Note 2: For information

#### 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.		

REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BWoccupied where specified in the test case.

#### 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		Unused REs (Note 2) in the symbols where	
	symbols where SSB/CSI-RS are not	SSB/CSI-RS are not transmitted from both	
	transmitted from both the serving	the serving beam probe and non-serving	
	beam probe and non-serving beam	beam probe.	
	probe.		
Channel	PDCCH	PDSCH	
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK	
		modulated data	
Antenna transmission	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
scheme			
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			

- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BW<sub>occupied</sub> where specified in the test case
- Note 3: No OCNG is transmitted from the probe transmitting non-serving beam.

# A.3.2.1.3 OCNG pattern 3: Generic OCNG pattern for unused REs in the same bandwidth as CORESET

Table A.3.2.1.3-1: OP.3: Generic OCNG pattern for unused REs in the same BW as CORESET

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.

# A.3.2.1.4 OCNG pattern 4: Generic OCNG pattern for all unused REs outside SSB slot(s)

Table A.3.2.1.4-1: OP.4: Generic OCNG pattern for all unused REs outside SSB slot(s)

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data

Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

# A.3.2.1.5 OCNG pattern 5: Generic OCNG pattern for unused REs in the same bandwidth as CORESET for 2AoA setup

Table A.3.2.1.5-1: OP.5: Generic OCNG pattern for unused REs in the same BW as CORESET 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 for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 3: No OCNG is transmitted from the probe transmitting non-serving beam.

### A.3.2.2 Void

#### Reference DRX configurations A.3.3

#### DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms A.3.3.1

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	r 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	psf2		
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 and TAT = 500 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	psf2	
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.3.3.12 DRX Configuration 12: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.12-1: DRX.12: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value	
drx-onDurationTimer	psf6	
drx-InactivityTimer	psf2	
drx-RetransmissionTimer	psf16	
longDRX-CycleStartOffset	sf640, 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.3.4 Test Cases with Different Channel Bandwidths

#### A.3.4.1 Test Cases with Different E-UTRA Channel Bandwidths

#### A.3.4.1.1 Introduction

In Annex A test cases involving E-UTRA cell(s) may be defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement.

### A.3.4.1.2 Principle of testing

If multiple test cases involving E-UTRA cell(s) are defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement that is E-UTRA channel bandwidth independent, then the UE needs to be tested with only one channel bandwidth in each E-UTRA cell and with the same bandwidth in all the E-UTRA cells used in the test case.

# A.3.5 Test Cases for Synchronous and Asynchronous DC Operations

# A.3.5.1 EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations

#### A.3.5.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for EN-DC operation in synchronous and asynchronous scenarios.

In Annex A test cases may be defined in both synchronous EN-DC and asynchronous EN-DC scenarios to verify the same type of RRM requirement.

#### A.3.5.1.2 Principle of Testing

If EN-DC test cases are defined in both synchronous and asynchronous EN-DC scenarios to verify the same type of RRM requirement then the UE capable of both synchronous and asynchronous EN-DC operations needs to be tested with one of the tests in either synchronous or asynchronous EN-DC scenarios.

# A.3.6 Antenna configurations

# A.3.6.1 Antenna configurations for FR1

Unless otherwise specified, NR FDD or NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

#### A.3.6.1.1 Antenna connection for 4 Rx capable UEs

#### A.3.6.1.1.1 Introduction

All tests in clause A.4 and A.6 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.4 or A.6 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

#### A.3.6.1.1.2 Principle of testing

#### A.3.6.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one band where 2RX is supported and 4RX is not supported, all single carrier tests specified in clause A.4 and A.6 except those in A.4.7 and A.6.7 shall be tested on any band where 2RX is supported and 4RX is not supported with the antenna connection specified in A.3.6.1.1.2.4. For single carrier tests specified in clause A.4.7 or A.6.7, all tests shall be tested with the antenna connection specified in A.3.6.1.1.2.4 for bands where 2RX is supported and 4RX is not 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 band where 2RX is supported and 4RX is not supported, all tests specified in clauses A.4 and A.6 shall be tested using the antenna connection specified in clause A.3.6.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6.1.1.2.1-1 and table A.3.6.1.1.2.1-2. For beam failure detection and link recovery tests, the SNR levels are modified according to table A.3.6.1.1.2.1-3.

Table A.3.6.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection

Test case	SNR during T3 (dB)			
	Test 1	Test 2	Test 3	Test 4
A.4.5.1.1	-18	N/A	N/A	N/A
A.4.5.1.3	-18	N/A	N/A	N/A
A.4.5.1.5	-18	N/A	N/A	N/A
A.4.5.1.7	-18	N/A	N/A	N/A
A.5.5.1.1	-18	N/A	N/A	N/A
A.5.5.1.3	-18	N/A	N/A	N/A
A.5.5.1.5	-18	N/A	N/A	N/A
A.5.5.1.7	-18	N/A	N/A	N/A
A.6.5.1.1	-18	N/A	N/A	N/A
A.6.5.1.3	-18	N/A	N/A	N/A
A.6.5.1.5	-18	N/A	N/A	N/A
A.6.5.1.7	-18	N/A	N/A	N/A
A.7.5.1.1	-18	N/A	N/A	N/A
A.7.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.5	-18	N/A	N/A	N/A
A.7.5.1.7	-18	N/A	N/A	N/A

Table A.3.6.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

Test case	SNR during T3 (dB)		case SNR during T3 (dB)		SNR durin	g 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 for RS in set q <sub>0</sub> during T3, T4 and T5 (dB)
	Test 1
A.4.5.5.1	-15
A.4.5.5.2	-15
A.4.5.5.3	-15
A.4.5.5.4	-15
A.5.5.5.1	-15
A.5.5.5.2	-15
A.5.5.5.3	-15
A.5.5.5.4	-15
A.6.5.5.1	-15
A.6.5.5.2	-15
A.6.5.5.3	-15
A.6.5.5.4	-15
A.7.5.5.1	-15
A.7.5.5.2	-15
A.7.5.5.3	-15
A.7.5.5.4	-15

#### A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna connection 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 EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.6 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using 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 EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PSCell or SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna

connection 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 and 4RX is not supported, it is left to the UE declaration and antenna port 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 and beam failure detection thresholds described in clauses A.3.6.1.1.2.1, 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 E-UTRAN bands where 2RX is supported and 4RX is not supported, it is left to the UE declaration and antenna port 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 E-UTRAN bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

## A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, the default Downlink Antenna Configuration for NR FR2 cells is 1x2.

In case of Downlink Antenna Configuration 2x2 for NR FR2 cells, unless otherwise specified, the downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.

In both cases, the downlink signal is received assuming 2 UE baseband receivers. As the UE is tested following the Blackbox Approach with regard to the UE Rx antennas, the exact UE Rx antenna configuration is not relevant for the test configuration and has no impact on the test implementation.

# A.3.7 EN-DC test setup

#### A.3.7.1 Introduction

## A.3.7.2 E-UTRAN Serving Cell Parameters

#### A.3.7.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

Table A.3.7.2.1-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with all NR cells in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the NR carrier. The E-UTRA serving cell shall configured to not interfere with NR operation and the E-UTRA serving cell 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 Cell
Duplex mode		FDD or TDD
TDD special subframe configuration <sup>Note1</sup>		
TDD special subtraine configuration Note1		6
TDD uplink-downlink configuration <sup>Note1</sup>		•
BW <sub>channel</sub>		5 MHz: N <sub>RB,c</sub> = 25
		10 MHz: N <sub>RB,c</sub> = 50
DD00H		20 MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel <sup>Note2</sup>		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
DOCIOLI/DDOOLI/DLIIOLI		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel <sup>Note2</sup>		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
O O N O D Note 2		20 MHz: R.10 TDD
OCNG Patterns <sup>Note2</sup>		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
PROUL DA	in.	20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	0
PHICH_RB PDCCH_RA	dB dB	0
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB OCNG RA <sup>Note3</sup>	dB	
	dB	
OCNG_RB <sup>Note3</sup> Noc <sup>Note4</sup>	dB	404
	dBm/15 kHz	-104
Ês/Noc	dB	17
Ê <sub>s</sub> /I <sub>ot</sub>	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
Io Note5	dBm/Ch BW	-59.13+10log(N <sub>RB,c</sub> /50)
Propagation Condition		AWGN
Antenna Configuration		1x2

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 5: E<sub>s</sub>/I<sub>ot</sub>, 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 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<sub>oc</sub> to be fulfilled.

#### 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 Cell
Duplex mode		FDD or TDD
TDD special subframe configuration <sup>Note1</sup>		6
TDD uplink-downlink configuration <sup>Note1</sup>		1
BW <sub>channel</sub>	MHz	5 MHz: N <sub>RB,c</sub> = 25
		10 MHz: N <sub>RB,c</sub> = 50
		20 MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel <sup>Note2</sup>		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 <sup>Note2</sup>		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 <sup>Note2</sup>		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 <sup>Note3</sup>	dB	
OCNG_RB <sup>Note3</sup>	dB	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

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 shall not affect the test result unless otherwise specifically stated in the test case.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

# 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 shall not affect the test result unless otherwise specifically stated in the test case.

### A.3.7B Void

# A.3.7C LTE-FR1/FR2 test setup

Some Test cases in clause A.5 have LTE and FR2 NR cells. Unless otherwise stated within the test, the LTE Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free LTE signal without need of precise propagation modelling, path loss and polarization control. Further details of the LTE signal configuration are not defined as part of the cell specific test parameters, since the LTE link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

# A.3.7D NE-DC test setup

A.3.7D.1 Introduction

## A.3.7D.2 E-UTRAN Serving Cell Parameters

A.3.7D.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

The parameters are same as as specified in clause A.3.7.2.1.

### A.3.7D.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

The parameters are same as as specified in clause A.3.7.2.2.

# A.3.8 PRACH configurations

#### A.3.8.1 Introduction

This clause provides the typical PRACH configurations used for RRM test cases defined in Annex A. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

# A.3.8.2 PRACH configurations in FR1

## A.3.8.2.1 FR1 PRACH configuration 1

FR1 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR1.

Table A.3.8.2.1-1: Parameters for FR1 PRACH configuration 1

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed	
		configuration defined in table 6.3.3.2-2 and table 6.3.3.2-	
		3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL		
	carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based	
		and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence =	
		1.	
ssb-perRACH-OccasionAndCB-	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions	
PreamblesPerSSB		n48: 48 contention based preambles per SSB	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time	
		instance.	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined	
		in TS 38.331 [2].	
ra-ContentionResolutionTimer	sf48	48 sub-frames	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed	
		before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N <sub>CS</sub> = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

## A.3.8.2.2 FR1 PRACH configuration 2

FR1 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based 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 <sub>CS</sub> = 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 se	ee clause 6.3.2 in TS 38.331 [2	·].

# A.3.8.2.3 FR1 PRACH configuration 3

FR1 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR1.

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

Field	Value	Comment
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N <sub>CS</sub> = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].

csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

## A.3.8.2.4 FR1 PRACH configuration 4

FR1 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR1 to convey BFR.

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

Field	Value	Comment	
prach-ConfigurationIndex	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].	
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, Ncs = 93	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

# A.3.8.3 PRACH configurations in FR2

### A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR2.

Table A.3.8.3.1-1: Parameters for FR2 PRACH configuration 1

Field	Value	Comment
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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-	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 <sub>CS</sub> = 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 clause 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
		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 <sub>CS</sub> = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].

ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE doesn't use this field if is transmitting CFRA to			
		convey BFR.			
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE uses this field only if is transmitting CFRA to convey BFR			
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed			
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].			
Note: For further information see clause 6.3.2 in TS 38.331 [2].					

## A.3.8.3.3 FR2 PRACH configuration 3

FR2 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Table A.3.8.3.3-1: Parameters for FR2 PRACH configuration 3

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random acces
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission
		performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
131p-1111e311010C31-N3	NONF_01	105dBm, as defined in TS 38.331 [2].
Note: For further information so	ee clause 6.3.2 in TS 38.331 [2]	,
inote. For further information s	ee clause 0.3.2 III 13 30.331 [2]	

### A.3.8.3.4 FR2 PRACH configuration 4

FR2 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR2 to convey BFR.

Table A.3.8.3.4-1: Parameters for FR2 PRACH configuration 4

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
Total partial control of the control		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 s	ee clause 6.3.2 in TS 38.331 [2]	].

# A.3.9 BWP configurations

### A.3.9.1 Introduction

This clause provides the typical BWP configurations used for RRM test cases defined in Annex A. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.3. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

# A.3.9.2 Downlink BWP configurations

#### A.3.9.2.1 Initial BWP

Table A.3.9.2.1-1: Downlink BWP patterns for initial BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		DLBWP.0.1	DLBWP.0.2	

Starting PRB index		0	RB <sub>c</sub> Note 1		
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test		
-	e lowest PRB index to guarantee the BWP including CORESET #0 which				
is defined in Clause A 3.1.2					

### A.3.9.2.2 Dedicated BWP

Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration

BWP Par	rameters	Unit		Va	alues		
Reference	BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3	DLBWP.1.4	
Starting P	RB index		0	RB <sub>b</sub> Note 1	RBa Note 2	0	
Bandwidth	1	RB	Same as RF channel defined in each test	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	24 for SSB SCS = 120KHz 24 for SSB SCS = 240KHz	
Note 1:	Note 1: RB <sub>b</sub> is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RB <sub>J</sub> ,						
Note 2:	RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) which is defined in Clause A.3.10. RB <sub>a</sub> is the lowest PRB index to guarantee the BWP including SSB PRB index (RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) which is defined in Clause A.3.10.						

# A.3.9.3 Uplink BWP configurations

### A.3.9.3.1 Initial BWP

Table A.3.9.3.1-1: Uplink BWP patterns for initial BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		ULBWP.0.1	ULBWP.0.2	
Starting PRB index		0	RB <sub>c</sub> Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	

### A.3.9.3.2 Dedicated BWP

Table A.3.9.3.2-1: Uplink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values			
Reference BWP		ULBWP.1.1	ULBWP.1.2	ULBWP.1.3	ULBWP.1.4
Starting PRB index		0	RB <sub>b</sub> Note 1	RB <sub>a</sub> Note 2	0

Bandwidt	th	RB	Same as RF	25 for SSB SCS =	25 for SSB SCS =	24 for SSB SCS =
			channel defined	15KHz,	15KHz,	120KHz
			in each test	51 for SSB SCS =	51 for SSB SCS =	24 for SSB SCS =
				30KHz,	30KHz,	240KHz
				32 for SSB SCS =	32 for SSB SCS =	
				120KHz	120KHz	
				48 for SSB SCS =	48 for SSB SCS =	
				240KHz	240KHz	
Note 1: RB <sub>b</sub> is same as RB <sub>b</sub> for DLBWP.1.2 as defined in Table A.3.9.2.2-1.						
Note 2:	ote 2: RB <sub>a</sub> is same as RB <sub>a</sub> for DLBWP.1.3 as defined in Table A.3.9.2.2-1.					

# A.3.10 SSB Configurations

# A.3.10.1 SSB Configurations for FR1

## A.3.10.1.1 SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.1-1: SSB.1 FR1: SSB Pattern 1 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values			
Channel bandwidth	10 MHz			
SSB SCS	15 kHz			
SSB periodicity (T <sub>SSB</sub> )	20 ms			
Number of SSBs per SS-burst	1			
SS/PBCH block index	0			
Symbol numbers containing SSB Note 2	2-5			
Slot numbers containing SSB Note 2	0			
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$			
RB numbers containing SSB within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>			
Note 1: RBs containing SSB can be configured in any frequency location within the bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].				
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselv				

## A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.2-1: SSB.2 FR1: SSB Pattern 2 for SSB SCS=30 kHz in 40 MHz channel

SSB Parameters	Values				
Channel bandwidth	40 MHz				
SSB SCS	30 kHz				
SSB periodicity (T <sub>SSB</sub> )	20 ms				
Number of SSBs per SS-burst	1				
SS/PBCH block index	0				
Symbol numbers containing SSB Note 3	4-7 or 2-5 Note 2				
Slot numbers containing SSB Note 3	0				
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$				
RB numbers containing SSB within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>				
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.

Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.

## A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.3-1: SSB.3 FR1: SSB Pattern 3 for SSB SCS=15 kHz in 10 MHz channel

	SSB Parameters	Valu	ies
Channel bandwidth		10 MHz	
SSB SC	S	15 kHz	
SSB peri	iodicity (T <sub>SSB</sub> )	20 ms	
Number	of SSBs per SS-burst	2	
SS/PBCI	H block index	0	1
Symbol numbers containing SSB Note 2		2-5	8-11
Slot numbers containing SSB Note 2		0	0
SFN containing SSB		SFN mod (max(Tssi	s,10ms)/10ms) = 0
RB numbers containing SSB within channel BW		(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>s</sub>	J+19)Note 1
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves			

## 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	dwidth 40 MHz		
SSB SCS	5	30 kHz		
SSB peri	odicity (T <sub>SSB</sub> )	20 ms	20 ms	
Number	of SSBs per SS-burst	2		
SS/PBCF	l block index	0	1	
Symbol n	numbers containing SSB Note 3	4-7 or 2-5 Note 2	8-11	
Slot num	bers containing SSB Note 3	0	0	
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSB within channel BW		(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>s</sub>	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>	
Note 1:				
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.				
Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.				

# A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MHz

Table A.3.10.1.5-1: SSB.5 FR1: SSB Pattern 5 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values	
Channel bandwidth	10 MHz	
SSB SCS	15 kHz	
SSB periodicity (T <sub>SSB</sub> )	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 2	2-5	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$	
RB numbers containing SSB within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>	
Note 1: RBs containing SSB can be configured		
bandwidth according to the allowed syn	chronization raster defined in TS	
38.104 [13].		
Note 2: These values have been derived from other parameters for information		
purposes (as per TS 38.213 [3]). They are not settable parameters themselves		

# A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MHz

Table A.3.10.1.6-1: SSB.6 FR1: SSB Pattern 6 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values
Channel bandwidth		40 MHz
SSB SCS	S	30 kHz
SSB peri	iodicity (T <sub>SSB</sub> )	20 ms
Number	of SSBs per SS-burst	1
SS/PBCI	H block index	0
	numbers containing SSB Note 3	4-7 or 2-5 Note 2
Slot num	bers containing SSB Note 3	0
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$
RB numb	pers containing SSB within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>
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 curren band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.		
Note 3: These values have been derived from other parameters for information purpose (as per TS 38.213 [3]). They are not settable parameters themselves.		

# A.3.10.2 SSB Configurations for FR2

A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	

		T	
SSB SCS		120 kHz	
SSB periodicity (T <sub>SSB</sub> )		20 ms	
Number of SSBs per SS-burst		2	
SS/PBCH block index		0	1
Symbol numbers containing SSBs Note 2		4-7	8-11
Slot numbers containing SSB Note 2		0	0
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW		(RBJ, RBJ+1,, RBJ+19) <sup>Note 1</sup>	
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			ed in TS 38.104 [13].
Note 2: These values have been derived from other parameters for information purposes (per TS 38.213 [3]). They are not settable parameters themselves.			rmation purposes (as

## 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	3	240 kHz	240 kHz	
SSB peri	odicity (T <sub>SSB</sub> )	20 ms		
Number	of SSBs per SS-burst	2		
SS/PBCI	H block index	0	1	
Symbol numbers containing SSBs Note 2		8-11	12-13	0-1
Slot numbers containing SSB Note 2		0	0	1
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numb	pers containing SSBs within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,.	, RB <sub>J+39</sub> )Note 1	
Note 1:				the cell
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13 Note 2: These values have been derived from other parameters for information purposes (a per TS 38.213 [3]). They are not settable parameters themselves.				
			purposes (as	

## 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 (T <sub>SSB</sub> )	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2	4-7	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+19</sub> ) <sup>Note 1</sup>	
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.		
Note 2: These values have been derived from oth	ner parameters for information purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.		

## A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	240 kHz	
SSB periodicity (T <sub>SSB</sub> )	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2	8-11	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+39</sub> ) <sup>Note 1</sup>	
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed sync	hronization raster defined in TS 38.104 [13].	
Note 2: These values have been derived from other	ner parameters for information purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.		

## A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

	SSB Parameters	Val	ues
Channel bandwidth		100 MHz	
SSB SCS	5	120 kHz	
SSB peri	odicity (T <sub>SSB</sub> )	20 ms	
Number of	of SSBs per SS-burst	2	
	l block index	2	3
Symbol numbers containing SSBs Note 2		2-5	6-9
Slot numbers containing SSB Note 2		1	1
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW		(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+</sub>	-19)Note 1
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 [			
Note 2: These values have been derived from other parameters for information purposes		rmation purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.			s.

## A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity (T <sub>SSB</sub> )	20 ms	20 ms	
Number of SSBs per SS-burst	2	2	
SS/PBCH block index	2	3	
Symbol numbers containing SSBs Note 2	2-5	6-9	
Slot numbers containing SSB Note 2	1	1	
SFN containing SSB	SFN mod (max	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	

RB numl	bers containing SSBs within channel BW	(RB <sub>J</sub> , RB <sub>J+1</sub> ,, RB <sub>J+39</sub> ) <sup>Note 1</sup>
Note 1:	3	any frequency location within the cell aronization raster defined in TS 38.104 [13].
Note 2:	,	

## 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 (T <sub>SSB</sub> )	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	1	
Symbol numbers containing SSBs Note 2	8-11	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
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]  Note 2: These values have been derived from other parameters for information purposes (as		
		per TS 38.213 [3]). They are not settable parameters themselves.

## A.3.10.2.8 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	Va	ues
Channel bandwidth	100 MHz	
SSB SCS	240 kHz	
SSB periodicity (T <sub>SSB</sub> )	periodicity (T <sub>SSB</sub> ) 20 ms	
Number of SSBs per SS-burst 1		
SS/PBCH block index	1	
Symbol numbers containing SSBs Note 2	12-13	0-1
Slot numbers containing SSB Note 2	0	1
SFN containing SSB SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		10ms)/10ms) = 0
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+39)Note 1		-39) <sup>Note 1</sup>
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from o	2: These values have been derived from other parameters for information purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.		

# A.3.11 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.3.11.5-1: 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.3.11.6 SMTC pattern 6: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.6-1: SMTC.6: SMTC Pattern 6 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	17 ms
SMTC duration	5 ms

# A.3.12 Test Cases with Different CC Configurations

## A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations

#### A.3.12.1.1 Introduction

In Annex A EN-DC test cases may be defined for two component carriers (CCs) as well as for more than two CCs to verify the same RRM requirement.

#### A.3.12.1.2 Principle of testing

If multiple EN-DC test cases are defined for two CCs as well as for more than two CCs to verify the same type of RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with the maximum number of CCs in EN-DC supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with two CCs in EN-DC supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

# A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations

#### A.3.12.2.1 Introduction

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

#### A.3.12.2.2 Principle of testing

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with the maximum number of CCs in CA supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with at least two CCs in CA supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in CA would depend on the test equipment capability.

# A.3.13 Test Cases in SA and EN-DC Operations

### A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

Editor's note: this clause may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.

## A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and
- verifies at least all RRM requirements covered in the test case(s), which is not performed.

# A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers

#### A.3.13A.1 Introduction

The following applies to UE compliant to this version of the specification when undergoing tests with a mix of E-UTRA/NR FR1 and NR FR2 carriers in clauses A.5, A.7 and A.8.

# A.3.13A.2 Principle of Testing in EN-DC

For test cases in clause A.5 listed in Table A.3.13A.2-1, the following applies:

- UE does not have to pass the test case

Table A.3.13A.2-1: Test cases UE does not have to pass in current version of specification (ENDC)

Clause	Test case slogan
A.5.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle
A.5.5.3.5	SCell Activation and deactivation of SCell in FR2
A.5.7.1.3	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

## A.3.13A.3 Principle of Testing in SA

For test cases in clause A.7 listed in Table A.3.13A.3-1, the following applies:

UE does not have to pass the test case

Table A.3.13A.3-1: Test cases UE does not have to pass in current version of specification (SA)

Clause	Test case slogan
A.7.5.3.2	SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2
A.7.5.6.1.2	NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA
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.7.6.2.6	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)
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.7.6.2.8	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)
A.7.7.1.3	SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

# A.3.13A.4 Principle of Testing in E-UTRA

For test cases in clause A.8 listed in Table A.3.13A.4-1, the following applies:

- UE does not have to pass the test case.

Table A.3.13A.4-1: Test cases UE does not have to pass in current version of specification (E-UTRA)

Clause	Test case slogan
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.8.4.2.6	NR Inter-RAT event triggered reporting tests for FR2 without SSB time
	index detection when DRX is used
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.8.4.2.8	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index
	detection when DRX is used

## A.3.13B Test Cases for EN-DC and NE-DC Operations

# A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations

#### A.3.13B.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying active BWP switch requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

#### A.3.13B.1.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

## A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations

#### A.3.13B.2.1 Introduction

This clause defines a principle which is applicable to test cases verifying SFTD accuracy requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

#### A.3.13B.2.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

# 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.	0	0

	T	1		
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
				0 for resource #0
		0 for resource #0	0 for resource #0	1 for resource #1
		0 101 lesouice #0	0 for resource #0	2 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0			3 for resource #3
112p-001-10-10-0010eld	0 for resource #0			4 for resource #4
		1 for resource #1	1 for resource #1	5 for resource #5
		1 101 1630dice #1	1 101 16300106 #1	6 for resource #6
				7 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	n.a.	n.a.
qci-illior ellodiccoi-No		TCI.State.1		II.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
				0 for resource #0
		6 for resource #0	6 for resource #0	1 for resource #1
				2 for resource #2
firstOFDMSymbolInTimeDo	4 for resource #0			3 for resource #3
main	4 for resource #0			4 for resource #4
		10 for resource #1	10 for resource #1	5 for resource #5
		10 101 lesouice #1	10 for resource #1	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 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)
N	(000		U D14/D	

Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

# 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
periodic	periodic	aperiodic	aperiodic
0	0	0	0
n.a.	off	off	on
n.a.	n.a.	0	0
n.a.	n.a.	n.a.	n.a.
0 for resource #0	0 for resource #0	0 for resource #0	0 for resource #0
			1 for resource #1
			2 for resource #2
			3 for resource #3
	1 for resource #1	1 for resource #1	4 for resource #4
			5 for resource #5
			6 for resource #6
			7 for resource #7
0	0	0	0
db0	db0	db0	db0
0	0	0	0
	periodic  0 n.a. n.a. n.a. 0 for resource #0  0 db0	periodic periodic  0	periodic         periodic         aperiodic           0         0         0           n.a.         off         off           n.a.         n.a.         0           n.a.         n.a.         n.a.           0 for resource #0         0 for resource #0         0 for resource #1           1 for resource #1         1 for resource #1         1 for resource #1           0         0         0           db0         db0         db0

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	0001	0001	0001		
nrofPorts	2	1	1	1		
firstOFDMSymbolInTimeDomain	4 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 4 for resource #4		
		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 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)		
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.						

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.	0	0
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		0 for resource #0	0 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0	1 for resource #1	1 for resource #1	3 for resource #3 4 for resource #4 5 for resource #5 6 for resource #6 7 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	0001	0001	0001
nrofPorts	2	1	1	1
				0 for resource #0
		6 for resource #0	6 for resource #0	1 for resource #1
		6 for resource #0	6 for resource #0	2 for resource #2
firstOFDMCvmb alla Tim a Danca in	5 for resource #0			3 for resource #3
firstOFDMSymbolInTimeDomain	5 for resource #0			4 for resource #4
		10 for resource #1	10 for recourse #1	5 for resource #5
		10 for resource #1	10 for resource #1	6 for resource #6
				7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM

startingRB 0	0	0	0
nrofRBs 276 (N	Note 1) 276 (N	Note 1) 276 (Note	1) 276 (Note 1)

Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

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.	4	4
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		0 for resource #0	0 for resource #0	0 for resource #0 1 for resource #1 2 for resource
nzp-CSI-RS-Resourceld	0 for resource #0			#2 3 for resource #3
nizp-coi-No-Nesourceia	o for resource #0	1 for resource #1	1 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 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	16	<del> </del>	
Offset	0		n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
firstOFDMSymbolInTimeDomain	5 for resource #0	6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
THE STEER STATE OF THE STATE OF	o 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	
startingRB	0	0	0	0	
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)	
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test					
case the Tes	t Equipment shall implemen	t CSI-RS only in the v	width of that BWP		

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

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

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

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

## A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

# A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

# A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

## A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table 3.15.3-1: Set of relative angular offsets between active probes for each power class

UE Power class	Relative angular offset between active probes
1	FFS

2	FFS
3	30°, 60°, 90°, 120° and 150°
4	FFS

# A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak

# A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the non Rx beam peak signal shall not be changed between test iterations.

# A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class.

For UE power class 3, the relative angular offset between the directions (AoAs) of the 2 active probes shall be changed for each test iteration, within the probe alignment described above. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

# A.3.16 TCI State Configuration

#### A.3.16.1 Introduction

This clause provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this clause are configured in each test when applicable to indicate that certain DL signals are QCL'ed with the referenceSignal configured in the TCI states.

#### 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 <sup>Note1</sup>	typeD	typeD	typeD	typeD
referenceSignal	SSB0	SSB1	Resource #4 in TRS	Resource #4 in TRS
_			resource set 1 Note3	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 <sup>Note 1</sup>		
SCS	kHz	15		
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I <sub>0</sub> = 5 for CSI-RS resource 1 and 3		
CSI-RS		I <sub>0</sub> = 9 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4		
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2 11 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	O <sup>Note 2</sup>		
TCI state		TCI.State.0		
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case				

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 <sup>Note 1</sup>	
SCS	kHz	30	
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		l <sub>0</sub> = 5 for CSI-RS resource 1 and 3	
CSI-RS		l <sub>0</sub> = 9 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	20 for CSI-RS resource 1 and 2	
COI-NO UIISEL	51015	21 for CSI-RS resource 3 and 4	

EPRE ratio to SSS		dB	ONote 2
TCI state			TCI.State.0
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases			BW size of UE active BWP in the RRM test cases
Note 2: Unless otherwise specified in the test case			

#### A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value			
Reference channel		TRS.1.1 TDD			
Bandwidth		BW of Active BWP <sup>Note 1</sup>			
SCS	kHz	15			
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4			
First OFDM symbol in the slot used for		l <sub>0</sub> = 5 for CSI-RS resource 1 and 3			
CSI-RS		l <sub>0</sub> = 9 for CSI-RS resource 2 and 4			
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4			
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4			
Density (ρ)		3 for CSI-RS resource 1,2,3,4			
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4			
CSI-RS offset	-1-4-	10 for CSI-RS resource 1 and 2			
CSI-RS dilset	slots	11 for CSI-RS resource 3 and 4			
EPRE ratio to SSS	dB	ONote 2			
TCI state		TCI.State.0			
Note 1 BW of TRS is configured same	Note 1 BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases				
Note 2: Unless otherwise specified in t	Note 2: Unless otherwise specified in the test case				

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value		
Reference channel		TRS.1.2 TDD		
Bandwidth		BW of Active BWP <sup>Note 1</sup>		
SCS	kHz	30		
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I <sub>0</sub> = 5 for CSI-RS resource 1 and 3		
CSI-RS		I <sub>0</sub> = 9 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4		
CCI DC offeet	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	O <sup>Note 2</sup>		
TCI state		TCI.State.0		
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases  Note 2: Unless otherwise specified in the test case				

## A.3.17.2 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 <sup>Note 1, 3</sup>		
SCS	kHz	120		
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I <sub>0</sub> = 1 for CSI-RS resource 1 and 3		
CSI-RS		l <sub>0</sub> = 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	SIOLS	41 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	ONote 2		
TCI state		TCI.State.0		
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases				
Note 2: Unless otherwise specified in the test case				

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active

Parameter	Unit	Value
Reference channel		TRS.2.2 TDD
Bandwidth		BW of Active BWP <sup>Note 1, 3</sup>
SCS	kHz	120
First subcarrier index in the PRB used for CSI-RS		k <sub>0</sub> =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I <sub>0</sub> = 2 for CSI-RS resource 1 and 3
CSI-RS		I <sub>0</sub> = 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	alata	40 for CSI-RS resource 1 and 2
CSI-RS offset	slots	41 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	O <sup>Note 2</sup>
TCI state		TCI.State.1

BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases Note 1:

Note 2: Unless otherwise specified in the test case

Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active

BWP size.

BWP size.

# A.3.18 Additional definitions related to OTA testing for FR2 RRM test cases

#### A.3.18.1 Introduction

FR2 RRM test cases are performed over the air (OTA). This clause provides additional definitions and clarifications on the OTA measurements and metrics defined or refered in the test cases.

#### A.3.18.2 PRACH Power Measurement

PRACH power is measured as EIRP(Link=Link angle, Meas=Link angle) as defined in clause 3.1 of TS 38.101-2 [19].

## A.4 EN-DC tests with all NR cells in FR1

- A.4.1 Void
- A.4.2 Void
- A.4.3 RRC\_CONNECTED state mobility
- A.4.3.1 Void
- A.4.3.2 RRC Connection Mobility Control
- A.4.3.2.1 Void
- A.4.3.2.2 Random Access
- A.4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC
- A.4.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.1.1-1. UE capable 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 required to be tested in one of the supported test configurations depending on UE capability				

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

Parameter			Unit	Test-1	Comments
SSB Configu	ration	Config 1,2		SSB pattern 3 in FR1	As defined in A.3.10
		Config 3,4		SSB pattern 4 in FR1	
Duplex Mode for Cell 2		Config 1,2		FDD	
	Config 3,4			TDD	
TDD Configu		Config 3,4		TDDConf.2.1	
OCNG Patter				OCNG pattern 1	As defined in A.3.2.1.
PDSCH para	meters <sup>Note</sup>	Config 1,2		SR.1.1 FDD	As defined in A.3.1.1.
4		Config 3,4		SR.2.1 TDD	
RMSI CORE Reference Cl		Config 1,2			CR.1.1 FDD
		Config 3,4			CR.2.1 TDD
Dedicated CO Reference Cl		Config 1,2			CCR.1.1 FDD
		Config 3,4			CCR.2.1 TDD
NR RF Chan	nel Number			1	
EPRE ratio o	f PSS to SS	S	dB		
EPRE ratio o	f PBCH_DM	IRS to SSS	dB		
EPRE ratio o			dB		
EPRE ratio o			dB	0	
		PDCCH_DMRS	dB		
EPRE ratio o			dB		
EPRE ratio o	f PDSCH to	PDSCH_DMRS	dB		
SSB with	$\hat{E}_s/I_{ot}$		dB	3	Power of SSB with index 0 is setto be above
index 0	$N_{oc}$	Config 1,2	dBm/15kHz	-98	configured rsrp-
	1 oc	Config 3,4		-101	ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	
	SS-RSRF	Note 3	dBm/ SCS	-95	
SSB with	$\hat{E}_s/I_{ot}$		dB	-17	Power of SSB with index  1 is set to be below
index 1	$N_{oc}$	Config 1,2	dBm/15kHz	-98	configured rsrp-
	1 oc	Config 3,4		-101	ThresholdSSB
$\hat{E}_s/N_{oc}$			dB	-17	
SS-RSRP Note 3		dBm/ SCS	-115		
lo Note 2		Config 1,2	dBm	-65.3/9.36MHz	For symbols without SSB
10		Config 3,4	] [	-62.2/38.16MHz	index 1

ss-PBCH-BlockPower	dBm/ SCS	-5	As defined in clause
SS-PBCH-BIOCKPOWEI			6.3.2 in TS 38.331 [2].
Configured UE transmitted power (	dBm	23	As defined in clause
$P_{\mathrm{CMAX, f,c}}$ )			6.2.4 in TS 38.101-1.
PRACH Configuration		FR1 PRACH configuration 1	As defined in A.3.8.2.
Propagation Condition	-	AWGN	·

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

#### A.4.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.4.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.4.3.2.2.1.2.5 void

A.4.3.2.2.1.2.6 void

#### A.4.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.4.3.2.2.2 Non-contention based random access test in FR1 for PSCell in EN-DC

#### A.4.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.2.1-1. UE capable 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).

 $Test\ 2\ is\ only\ applicable\ to\ UE\ which\ supports\ csi-RSRP-AndRSRQ-MeasWithSSB\ or\ csi-RSRP-AndRSRQ-MeasWithoutSSB.$ 

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 required to be tested in one of the supported test configurations depending on UE capability			

Table A.4.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

Para	Parameter		Unit	Unit Test-1		Comments
SSB Configuration		Config 1,2		SSB pattern 3 in FR1	SSB pattern 3 in FR1	As defined in A.3.10
		Config 3,4		SSB pattern 4 in	SSB pattern 4 in	
				FR1	FR1	
CSI-RS Configuratio	n	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
		Config 3,4			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode for Cel	12	Config 1,2		FDD	FDD	
		Config 3,4		TDD	TDD	
TDD Configuration		Config 3,4		TDDConf.2.1	TDDConf.2.1	
OCNG Pattern Note 1				OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters	Note	Config 1,2		SR.1.1 FDD	SR.1.1 FDD	As defined in
4		Config 3,4		SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
RMSI CORESET Reference Channel		Config 1,2		CR.1.1 TDD	CR.1.1 TDD	
		Config 3,4		CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORESE Reference Channel	Dedicated CORESET Config 1,2 Reference Channel Config 3,4			CCR.1.1 TDD	CCR.1.1 TDD	
				CCR.2.1 TDD	CCR.2.1 TDD	
NR RF Channel Nun	nber			1	1	
EPRE ratio of PSS to			dB			
EPRE ratio of PBCH			dB			
EPRE ratio of PBCH			dB			
EPRE ratio of PDCC			dB	0	0	
EPRE ratio of PDCC			dB			
EPRE ratio of PDSC			dB			
EPRE ratio of PDSC		PDSCH_DMRS	dB			
SSB with $\hat{E}_s$ / index 0	$I_{ot}$		dB	3	3	Power of SSB with index 0 is set to be
$N_{oc}$		Config 1,2	dBm/15kHz	-98	-98	above configured
1 oc	oc			-101	-101	rsrp-ThresholdSSB
$\hat{E}_s/L$	$\hat{E}_s/N_{oc}$		dB	3	3	
SS-R	SRF	Note 3	dBm/ SCS	-95	-95	
SSB with $\hat{E}_s$	$I_{ot}$		dB	-17	-17	Power of SSB with
index 1		Config 1,2	dBm/15kHz	-98	-98	index 1 is set to be

	$N_{oc}$	Config 3,4		-101	-101	below configured rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	-17	-17	
	SS-RSRI	Note 3	dBm/ SCS	-115	-115	
Io Note 2		Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 11010 2		Config 3,4		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-Bloo	ckPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power (		dBm	23	23	As defined in clause	
$P_{\text{CMAX, f,c}}$ )					6.2.4 in TS 38.101- 1.	
PRACH Configuration			FR1 PRACH	FR1 PRACH	As defined in	
				configuration 2	configuration 3	A.3.8.2.
Propagation (	Condition		-	AWGN	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

#### A.4.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

#### A.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2.. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

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

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.4.3.2.3 Void

## A.4.4 Timing

## A.4.4.1 UE transmit timing

#### A.4.4.1.1 NR UE Transmit Timing Test for FR1

#### A.4.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 4.4.1.1.1-1.

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	
Dupley Made		1,4	F	DD	
Duplex Mode		2,3,5,6	TE	DD	
		1,4	Not App	olicable	
TDD configuration		2,5	TDDC	onf.1.1	]
		3,6	TDDC	onf.2.1	
		1,4	10: N <sub>RI</sub>	B,c = 52	
BW <sub>channel</sub>	MHz	2,5	10: N <sub>RB,c</sub> = 52		
		3,6	40: N <sub>RB,c</sub> = 106		]
Initial BWP Configuration		1,2,3,4,5,6	123456 DLBWP.0.1		
Illitial BVVF Colliguration		ULBWP.0.1		/P.0.1	
Dedicated BWP		1,2,3,4,5,6 DLBWP.1.1		/P.1.1	
Configuration		ULBWP.1.1			
DRx Cycle	ms	1,2,3,4,5,6	N/A	DRX.8 <sup>Note5</sup>	
PDSCH Reference		1,4	SR.1.	1 FDD	
measurement channel	annel 2,5 SR.1.1 TDD				

	-	2.6	CD 0	1 TDD	I
		3,6		1 TDD	
RMSI CORESET		1,4	•	1 FDD	
Reference Channel		2,5	CR.1.	1 TDD	
		3,6	CR.2.	1 TDD	
		1,4		.1 FDD	
Dedicated CORESET Reference Channel		2,5	CCR.1	.1 TDD	
		3,6	CCR.2	.1 TDD	
OCNG Patterns		1,2,3,4,5,6	OF	P.1	
		1,4	SSB.	1 FR1	
SSB configuration		2,5	SSB.	1 FR1	
		3,6	SSB.2	2 FR1	
SMTC configuration		1,2,3,4,5,6	SMT	ΓC.2	
		1,4	TRS.1.	.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	KIIZ	3,6	3	0	
EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to	-				
PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS	dB	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)					
$N_{oc}$ Note2	dBm/15 kHz	1,2,3,4,5,6	-98	-98	
Muse		1,2,4,5	-98	-98	
$N_{OC}$ Note2	dBm/SCS	3,6	-95	-95	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1,2,3,4,5,6	3	3	
$\hat{E}_s/N_{oc}$		1,2,3,4,5,6	3	3	
SS-RSRP <sup>Note3</sup>	dBm/SCS	1,2,4,5	-95	-95	
· · <del>-</del> · · ·	ubiii/303	3,6	-92	-92	
		1,2,4,5	-65.2	-65.2	
Io <sup>Note3</sup>	dBm/9.36MHz	1,2,4,3			
Io <sup>Note3</sup>	dBm/9.36MHz dBm/38.1MHz	3,6	-59.2	-59.2	
Io <sup>Note3</sup> Propagation condition				'GN	
		3,6	-59.2		

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:	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.3.3.8-1
Note 6:	SRS configs are given in Table A.4.4.1.1.1-3

Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceIdList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2,4,5 25 for test configuration 3,6	25	14	Matches N <sub>RB,c</sub>
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

#### A.4.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within  $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$  of the first detected path of DL SSB.
  - a. The  $N_{TA}$  offset value (in  $T_c$  units) is 25600
  - b. The  $T_e$  values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.4.4.1.1.2-1

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

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
15	+64*64T <sub>c</sub>	+32*64T <sub>c</sub>	
30	+32*64T <sub>c</sub>	+16*64T <sub>c</sub>	

- 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 7.1.2.1-1 until the UE transmit timing offset is within ( $N_{TA} + N_{TA\_offset}$ ) ×T<sub>c</sub>  $\pm$  T<sub>e</sub> respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within  $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$  of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

#### A.4.4.2 UE timer accuracy

#### A.4.4.3 Timing advance

#### A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

#### A.4.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

#### A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.4.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

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

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 <sub>A</sub> ) value during T1		31	N <sub>TA_new</sub> = N <sub>TA_old</sub> for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T <sub>A</sub> ) value during T2		39	For 15 kHz SCS $N_{TA\_new} = N_{TA\_old} + 8192*T_c$ For 30 kHz SCS $N_{TA\_new} = N_{TA\_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	S	5	

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

Parameter		Unit	Test1	
		Oilit	T1	T2
Duplex mode Config 1,4			F	)D

	Config 2,3,5,6		TDD
	Config 1,4		Not Applicable
TDD configuration	Config 2,5		TDDConf.1.1
122 comigaranon	Config 3,6		TDDConf.2.1
	Config 1,4		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	Config 2,5	MHz	10: N <sub>RB,c</sub> = 52
DVV channel	Config 3,6	IVII IZ	40: N <sub>RB,c</sub> = 106
	Config 1,4		10: N <sub>RB,c</sub> = 100
DWD DW	Config 2,5	N 41 1-	10: NRB,c = 52 10: NRB,c = 52
BWP BW		MHz	40: N <sub>RB,c</sub> = 32
	Config 3,6		<i>y</i> -
DRx Cycle		ms	Not Applicable
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
Reference Channel	Config 2,5		CR.1.1 TDD
Reference Charmer	Config 3,6		CR2.1 TDD
	Config 1,4		CCR.1.1 FDD
Dedicated CORESET Reference Channel	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
	Config 1,4		TRS.1.1 FDD
TRS configuration	Config 2,5		TRS.1.1 TDD
3	Config 3,6		TRS.1.2 TDD
OCNG Patterns	,		OCNG pattern 1
	Config 1,2,4,5		SSB.1 FR1
SSB Configuration	Config 3,6		SSB.2 FR1
	Config 1,2,4,5		SMTC.1 FR1
SMTC configuration	Config 3,6		SMTC.2 FR1
PDSCH/PDCCH	Config 1,2,4,5		15 kHz
subcarrier spacing	Config 3,6	kHz	30 kHz
PUCCH/PUSCH	Config 1,2,4,5		15 kHz
subcarrier spacing	Config 3,6	kHz	30 kHz
EPRE ratio of PSS to SS			30 KHZ
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to I			
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to			
EPRE ratio of PDSCH D		dB	0
EPRE ratio of PDSCH to EPRE ratio of OCNG DN			
	, ,		
EPRE ratio of OCNG to	OCING DIVIKS (NOTE		
1)		dD == /4 F1-1 1	
N oc Note2		dBm/15kH	-98
		Z	
$N_{oc}$ Note2 Config 1,2,4 Config 3,6	N <sub>oc</sub> Note2 Config 1,2,4,5 Config 3.6		-98 -95
$\hat{E}_s/I_{ot}$		dB	3
$\hat{E}_s/N_{oc}$		dB	3
Config 1,2,4	·,5	dBm/ 9.36MHz	-67.57
Io <sup>Note3</sup> Config 3,6		dBm/ 38.16MHz	-62.58
Propagation condition		36. I DIVITIZ	AWGN
Propagation condition		-	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not 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.

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			
U-5K5	Config 3,6	24	Fragues as benefits to disable d	
b-9	SRS	0	Frequency hopping is disabled	
b-l	пор	0		
freqDoma	inPosition	0	Frequency domain position of SRS	
freqDon	nainShift	0		
groupOrSequ	ienceHopping	neither	No group or sequence hopping	
		sl5=2 for SCS	Once every 5 slots	
SPS-Pariodi	cityAndOffset	15kHz		
SING-F CHOOL	CityAndOnset	sl5=4 for SCS		
		30kHz		
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation	
usa	age	Codebook	Codebook based UL transmission	
startP	osition	0	resourceMapping setting. SRS on last	
nrofSy	mbols	n1	symbol of slot, and 1symbols for SRS	
repetition	nFactor	n1	without repetition.	
combO	combOffset-n2		transmissionComb actting	
cyclics	cyclicShift-n2		transmissionComb setting	
nrofSR	S-Ports	port1	Number of antenna ports used for SRS	
			transmission	
Note: For further information see clause 6.3.2 in TS 38.331 [2].				

#### A.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

# A.4.5 Signaling characteristics

## A.4.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

# A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

#### A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.1.1-1. The test parameters are given in Tables A.4.5.1.1.1-2, A.4.5.1.1.1-3, and A.4.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.1.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and 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 Chan	nel Number		1
Active PSCell			Cell 2
RF Channel Numb	er		2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW <sub>channel</sub>	Config 1, 4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2, 5		10: N <sub>RB,c</sub> = 52
	Config 3, 6		40: N <sub>RB,c</sub> = 106
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1

DI I II I	0 " 10015		
DL dedicated	Config 1, 2, 3, 4, 5,		51 5145 4 4
BWP	6		DLBWP.1.1
configuration			
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1
configuration	6		
UL dedicated	Config 1, 2, 3, 4, 5,		
BWP	6		ULBWP.1.1
configuration			
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.3 FDD
CORESET	, , , ,		
Reference			
Channel			
Onamo	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 1, 4		SSB.1 FR1
Configuration			
CMTC	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier	Config 3, 6		30 kHz
spacing			
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
SSB index assigned	ed as RLM RS		0
OCNG parameters	<b>;</b>		OP.1
CP length			Normal
Correlation Matrix	and Antenna		2x2 Low
Configuration			
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
'			_
		CCE	
	Aggregation level	CCE dB	8
	Aggregation level Ratio of hypothetical	CCE dB	
	Aggregation level Ratio of hypothetical PDCCH RE energy		8
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE		8
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	8 4
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical		8
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS	dB	8 4
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	8 4
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	8 4
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder	dB	8 4
	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	8 4 4 REG bundle size
DRX	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder	dB	8 4 4 REG bundle size 6
DRX Gan nattern ID	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	8 4 4 REG bundle size 6 OFF
Gap pattern ID	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	8 4  REG bundle size  6  OFF  gp0
Gap pattern ID Layer 3 filtering	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	8 4  4  REG bundle size  6  OFF  gp0  Enabled
Gap pattern ID Layer 3 filtering T310 timer	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	8 4  REG bundle size  6  OFF  gp0  Enabled 0
Gap pattern ID Layer 3 filtering T310 timer T311 timer	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	8 4  REG bundle size  6 OFF gp0 Enabled 0 1000
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	8 4  REG bundle size  6 OFF gp0 Enabled 0 1000 1
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	8 4  REG bundle size  6  OFF  gp0  Enabled  0  1000  1
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 SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	8 4  REG bundle size  6  OFF  gp0  Enabled  0  1000  1  1  CSI-RS.1.1 FDD
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	8 4  REG bundle size  6  OFF  gp0  Enabled  0  1000  1

CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44

Note 1: All configurations are assigned to the UE prior to the start of time

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

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

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

Parameter		Unit		Test 1	
			T1	T2	Т3
EPRE ratio of P	dB		4		
EPRE ratio of PDCCH to PDCCH DMRS		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	PDSCH to PDSCH	dB			
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
M	Config 1, 4	dBm/		-98	
$N_{oc}$	Config 2, 5	15		-98	
Config 3, 6		kHz		-98	
N Config 1, 4		dBm/		-98	
$N_{oc}$	Config 2, 5	SCS		-98	
	Config 3, 6			-95	
Propagation co	ndition		TDL-0	C 300ns 1	100Hz

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density

is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

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

Field	Test 1
Field	Value
gapOffset	0

Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).

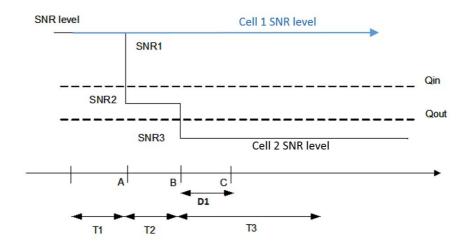


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

#### A.4.5.1.1.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

#### A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the

start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

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

Co	nfiguration	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

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Chann	nel Number		1
Active PSCell			Cell 2
RF Channel Numb	er		2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW <sub>channel</sub>	Config 1, 4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2, 5		10: N <sub>RB,c</sub> = 52
	Config 3, 6		40: N <sub>RB,c</sub> =
			106
DL initial BWP	Config 1, 2, 3,		DLBWP.0.1
configuration	4, 5, 6		DEDWI .O.1
DL dedicated	Config 1, 2, 3,		
BWP	4, 5, 6		DLBWP.1.1
configuration	0 " 1 0 0		
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1
configuration	4, 5, 6		
UL dedicated	Config 1, 2, 3,		LII D)MD 4 4
BWP	4, 5, 6		ULBWP.1.1
configuration TDD	Config 1, 4		Not Applicable
Configuration	Config 1, 4		TDDConf.1.1
Configuration	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.1 FDD
CORESET	Johns 1, 4		0011.11100
Reference			
Channel			
	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration			SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz

PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.1-1
J comigaration	Config 3, 6		Table
	Coming 5, 0		A.3.8.2.1-1
CCD index cosions	d oo DLM DC		
SSB index assigned	as klivi ko		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix a	ind Antenna		2x2 Low
Configuration			
In sync	DCI format		1-0
transmission	Number of		2
parameters	Control OFDM		
	symbols		
	Aggregation	CCE	4
	level	COL	7
		40	0
	Ratio of	dB	0
	hypothetical		
	PDCCH RE		
	energy to		
	average SSS		
	RE energy		
	Ratio of	dB	0
	hypothetical		
	PDCCH DMRS		
	energy to		
	average SSS		
	•		
	RE energy		DEC bundle
	DMRS precoder		REG bundle
	granularity		size
	REG bundle		6
	size		
Out of sync	DCI format		1-0
transmission	Number of		2
parameters	Control OFDM		
	symbols		
	Aggregation	CCE	8
	level		
	Ratio of	dB	4
	hypothetical	uD	-
	PDCCH RE		
	energy to		
	average SSS		
	RE energy		
	Ratio of	dB	4
	hypothetical		
	PDCCH DMRS		
	energy to		
	average SSS		
	RE energy		
	DMRS precoder		REG bundle
	granularity		size
	REG bundle		6
	size		
DRX			OFF
			N.A.
Gap pattern ID			IN.A. Enabled
Layer 3 filtering			Enabled
T310 timer	ms	1000	
T311 timer		ms	1000
	1110		
N310	-	1	
N311			1

		1
Config 1, 4		CSI-RS.1.1
reporting		FDD
Config 2, 5		CSI-RS.1.1
		TDD
Config 3, 6		CSI-RS.2.1
		TDD
Config 1, 4		TRS.1.1 FDD
Config 2, 5		TRS.1.1 TDD
Config 3, 6		TRS.1.2 TDD
	S	0.2
	S	0.2
T3		
T4		
T5		
D1		
	Config 3, 6  Config 1, 4  Config 2, 5	Config 2, 5  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6  s

Note 1: All configurations are assigned to the UE prior to the

start of time period T1.

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

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

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio o	f PDCCH DMRS to SSS	dB			0		
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					
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
NΙ	Config 1, 4	dBm/			-98		
$N_{oc}$	Config 2, 5	15	-98				
Config 3, 6		kHz	-98				
N Config 1, 4		dBm/	-98				
$N_{oc}$ Config 1, 4 Config 2, 5		SCS			-98		
Config 3, 6					-95		
Propagation	Propagation condition			TDL-C	300ns	100Hz	•

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

# SNR level SNR1 SNR5 Qin SNR2 SNR3 Cell 2 SNR level A B C D E F D1

#### Table A.4.5.1.2.1-4: Void

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

**T4** 

**T5** 

**T3** 

#### A.4.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

T2

# A.4.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

#### A.4.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.3.1-1. The test parameters are given in Tables A.4.5.1.3.1-2 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-

duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

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

Configurat	n 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 l	The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Pa	rameter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channe	el Number		1
Active PSCell			Cell 2
RF Channel Numbe	r		2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW <sub>channel</sub>	Config 1, 4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2, 5		10: N <sub>RB,c</sub> = 52
	Config 3, 6	1	40: N <sub>RB,c</sub> = 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
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1, 4		CCR.1.3 FDD
	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
3. 3.	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1

SSB index assigned	as RLM RS		0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix ar	nd Antenna Configuration		2x2 Low	
Out of sync	DCI format		1-0	
transmission	Number of Control		2	
parameters	OFDM symbols			
	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	4	
	PDCCH RE energy to			
	average SSS RE			
	energy			
	Ratio of hypothetical	dB	4	
	PDCCH DMRS energy			
	to average SSS RE			
	energy			
	DMRS precoder		REG bundle size	
	granularity			
DD)/ 0 (i	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	Config 1, 4		TRS.1.1 FDD	
tracking	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	
Note 1: All configurations are assigned to the LIE prior to the start of time period				

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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

Table A.4.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

	Parameter	Unit	Test 1		
			T1	T2	T3
EPRE ratio	of PDCCH DMRS to SSS	dB		4	
EPRE ratio	of PDCCH to PDCCH DMRS	dB		0	
EPRE ratio	of PBCH DMRS to SSS	dB			
EPRE ratio	of PBCH to PBCH DMRS	dB			
EPRE ratio of PSS to SSS		dB		0	
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio	EPRE ratio of OCNG DMRS to SSS				
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

λI	Config 1, 4	dBm/15k	-98
$N_{oc}$	Config 2, 5	Hz	-98
	Config 3, 6		-98
M	Config 1, 4	dBm/SCS	-98
<sup>1</sup> V <sub>oc</sub>	Config 2, 5		-98
	Config 3, 6		-95
Propagation	on condition		TDL-C 300ns 100Hz

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

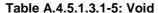
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.4.5.1.3.1-1.

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

Table A.4.5.1.3.1-4: Void



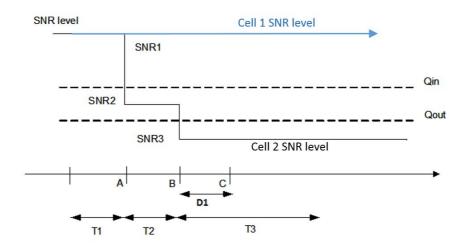


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

#### A.4.5.1.3.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

#### A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Configuration Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 2 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note: The UE is only required to pass in one of the supported test configurations in FR1

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

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 F LITDA DCell			Coll 4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel N	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW <sub>channel</sub>	Config 1, 4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2, 5		10: N <sub>RB,c</sub> = 52
	Config 3, 6		40: N <sub>RB,c</sub> = 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		DLBWF.1.1
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1
configuration	6		OLBVVF.U. I
UL dedicated BWP	Config 1, 2, 3, 4, 5,		ULBWP.1.1
configuration	6		ULBWF.I.I

TDD Configuration	Config 1, 4		Not Applicable
122 Conniguration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.1 FDD
CORESET	,		
Reference 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	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
SSB index assigned as			0
OCNG parameters	-		OP.1
CP length			Normal
Correlation Matrix and	Antenna		2x2 Low
Configuration			
In sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of	dB	0
	hypothetical		
	PDCCH RE energy		
	to average SSS RE		
	energy Ratio of	dB	0
	hypothetical	uв	U
	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		
	Aggregation level	CCE	8
	Ratio of	dB	4
	hypothetical		
	PDCCH RE energy		
	to average SSS RE		
	energy	40	
	Ratio of	dB	4
	hypothetical PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		TEO Barraio Sizo
I	REG bundle size		6
	KEG Dundle size		()

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	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.64
T4		S	0.2
T5	T5		0.88
D1		S	0.84

All configurations are assigned to the UE prior to the start of time period Note 1:

Note 3:

UE-specific PDCCH is not transmitted after T1 starts. Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio	of PDCCH DMRS to SSS	dB			0		
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	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio	of OCNG DMRS to SSS	dB					
EPRE ratio	of OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5	]	1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
$N_{oc}$	Config 1, 4	dBm/15			-98		
1 oc	Config 2, 5	kHz	-98				
Config 3, 6					-98		
N <sub>oc</sub> Config 1, 4 Config 2, 5 Config 3, 6		dBm/SCS			-98		
		]	-98				
					-95	·	
Propagation	n condition		TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and Note 4: SNR5 respectively in Figure A.4.5.1.4.1-1.

The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 5: testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

#### Table A.4.5.1.4.1-4: Void

#### Table A.4.5.1.4.1-5: Void

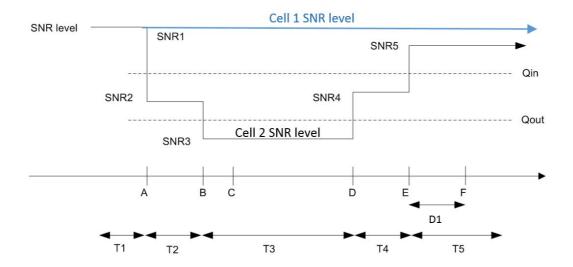


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

## A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

### A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is

configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

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

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
Buplex filede	Config 2, 3, 5, 6	-	TDD
TDD Configuration	Config 1, 4		Not Applicable
122 Configuration	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
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.3 FDD
Channel	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
Ğ	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
001007 0114	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD

	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH	I/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Anten	na Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dВ	4
	Ratio of hypothetical dB PDCCH DMRS energy to average CSI-RS RE energy		4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS1.1 FDD
-	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44

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

Parameter	Unit	Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB		4	
EPRE ratio of PDCCH to PDCCH DMRS	dB			
EPRE ratio of PBCH to PBCH DMRS	dB			
EPRE ratio of PSS to SSS	dB			
EPRE ratio of PBCH DMRS	dB			
to SSS			0	
EPRE ratio of PDSCH to	dB			
PDSCH DMRS				
EPRE ratio of PDSCH	dB			
DMRS to SSS				

EPRE ratio	o of OCNG DMRS	dB			
	o of OCNG to	dB			
SNR on	Config 1, 4	dB	1	-7	-15
RLM-RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
$N_{oc}$	Config 1, 4	dBm/15K		-98	
000	Config 2, 5	Hz		-98	
	Config 3, 6			-98	
Propagation	on condition			ΓDL-C 300ns 100Hz	,
	OCNG shall be used				
	total transmitted pov				
	The uplink resource	s for CSI rep	orting are assigned	to the UE prior to th	e start of time
	period T1.				
	NZP CSI-RS resour		juration for CSI repo	orting are assigned to	o the UE prior to
	the start of time peri				
	Measurement gap c				
Note 5:	The timers and laye period T1.	r 3 filtering re	elated parameters a	re configured prior to	o the start of time
Note 6:	The signal contains	PDCCH for	UEs other than the o	device under test as	part of OCNG.
Note 7:	SNR levels correspo	ond to the sig	gnal to noise ratio ov	er the SSS REs.	
Note 8:	The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3				
	respectively in figure A.4.5.1.5.1-1.				
Note 9:	9: The SNR values are specified for testing a UE which supports 2RX on at least one band.				
	For testing of a UE v	which suppo	rts 4RX on all bands	s, the SNR during T3	3 is specified in
	section A.3.6.1.1.				

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	
	Fleid		
	gapOffset	0	
Note 1:	Note 1: E-UTRAN PCell and PSCe synchronous and frame be aligned.		

Table A.4.5.1.5.1-4: Void

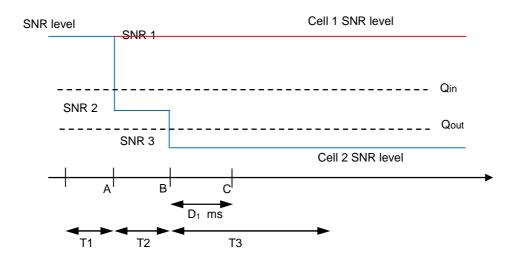


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

### 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 of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

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

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			

2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

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
, and the second	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DI initial DWD configuration	Config 1, 2, 3, 4, 5,		DI DIMD 0.4
DL initial BWP configuration	6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5,		DLBWP.1.1
DE dedicated DVV comigaration	6		525W1
UL initial BWP configuration	Config 1, 2, 3, 4, 5,		ULBWP.0.1
	6		0 2 2 1 1 1 1 1 1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	33g ., .		01
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated 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
CCD Coringulation	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
SW10 Comigaration	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier spacin	g Config 1, 2, 4, 5		15 KHz
1 Door in Door 1 subcarrier spacin	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
110 comiguration	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 1, 4		Resource #4 in TRS.1.1 TDD
CSI-RS IOI RLIVI	Config 2, 5		Resource #4 in TRS.1.1 TDD  Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDS			TCI.State.2
OCNG parameters	011		OP.1
CP length			Normal
Correlation Matrix and Antenna Co	unfiguration		2x2 Low
	I format		1-0
	mber of Control OFDM		2
	mbols		
Syl	IIIOII		

Out of sync transmission	Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy	٩D	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
	DCI format		1-0
In sync transmission	Number of Control OFDM symbols		2
parameters	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 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
	CH is not transmitted after T1 sta on-DRX mode under test.	rts.	

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
EPRE ratio of PDCCH DMRS to SSS	dB			0		
EPRE ratio of PDCCH to PDCCH DMRS	dB					
EPRE ratio of PBCH DMRS to SSS	dB					
EPRE ratio of PSS to SSS	dB			0		
EPRE ratio of PBCH to PBCH DMRS	dB					

EPRE ratio of DMRS	of PDSCH to PDSCH	dB						
EPRE ratio o	of PDSCH DMRS to	dB						
EPRE ratio o	of OCNG DMRS to	dB						
EPRE ratio of DMRS	of OCNG to OCNG	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	
N	Config 1, 4	dBm/15KHz	-98					
$N_{oc}$	Config 2, 5		-98					
	Config 3, 6		-98					
Propagation	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.4.5.1.6.1-1.

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 specified in section A.3.6.1.1.

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

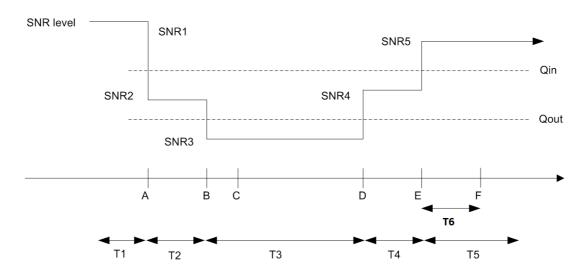


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

#### 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 of 5ms. 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 Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

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

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to pass in one of the supported test configurations in FR1

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1

	Config 2 6	1	TDDConf.2.1
DL initial BWP configuration	Config 3, 6 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	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
configuration	_		
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
D. II. A LOODESET	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1, 4		CCR.1.3 FDD
Reference Charmer	Config 2, 5 Config 3, 6	1	CCR.1.3 TDD CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
COD Coringulation	Config 2, 5		SSB.1 FR1
	Config 3, 6	1	SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PD	SCH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna (	Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311	10 5 4 4		1
CSI-RS for reporting	Config 1, 4 Config 2, 5		CSI-RS.1.1 FDD CSI-RS.1.1 TDD
	Touring 2, 3		001-100.1.1 TDD

	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1		S	1.24
Note 1:	UE-specific PDCCH is not transmitted after T1 starts	3.	
Note 2:	E-UTRAN is in non-DRX mode under test.		

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

EPRE ratio of PDCCH	Pa	rameter	Unit		Test 1		
DMRS to SSS  EPRE ratio of PDCCH to				T1	T2	T3	
EPRE ratio of PDCH to PDCH DMRS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to dB PBCH DMRS EPRE ratio of PBCH to dB PBCH DMRS EPRE ratio of PDSCH dB DMRS to SSS EPRE ratio of PDSCH dB DMRS to SSS EPRE ratio of PDSCH dB DMRS to SSS EPRE ratio of OCNG DMRS dB EPRE ratio of OCNG DMRS dB EPRE ratio of OCNG to dB DOCH DMRS EPRE ratio of OCNG to dB Config 1, 4 dB 1 -7 -15 Config 2, 5 1 -7 -15 Config 3, 6 1 -7 -15 Config 3, 6 1 -7 -15 Config 3, 6 98 Propagation condition TDL-C 300ns 100Hz Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1. Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.	EPRE ratio	of PDCCH	dB		4		
EPRE ratio of PBCH DMRS  EPRE ratio of PBCH to							
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to BBCH DMRS EPRE ratio of PBCH to BBCH DMRS EPRE ratio of PBCH to BBCH DMRS EPRE ratio of PDSCH BMRS EPRE ratio of OCNG DMRS BEPRE ratio of OCNG DMRS BEPRE ratio of OCNG DMRS BEPRE ratio of OCNG to BMRS EPRE ratio of OCNG to BMRS  EPRE ratio of OCNG to BMRS SNR Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6 BMM/15KHz B			dB				
EPRE ratio of PBCH to dB PBCH DMRS  EPRE ratio of PBCH to dB PBCH DMRS  EPRE ratio of PDSCH dB DMRS to SSS  EPRE ratio of PDSCH to dB PDSCH DMRS  EPRE ratio of OCNG DMRS dB EPRE ratio of OCNG DMRS dB EPRE ratio of OCNG to dB OCNG DMRS  SNR Config 1, 4 dB 1 -7 -15 Config 2, 5 1 -7 -15 Config 3, 6 1 -7 -15  Config 1, 4 dBm/15KHz -98 Config 1, 4 dBm/15KHz -98 Config 2, 5 1 -98 Config 3, 6 -98 Propagation condition TDL-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.							
EPRE ratio of PBCH to PBCH to PBCH DMRS  EPRE ratio of PBCH to DMRS  EPRE ratio of PDSCH DMRS  EPRE ratio of PDSCH DMRS  EPRE ratio of PDSCH DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG to DMRS  EPRE ratio of OCNG to DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG to DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG to DMRS  EPRE ratio of OCNG to DMRS  EPRE ratio of OCNG DMRS  ABB  EPRE ratio of PDSCH to DAB  ABB  O  BERE ratio of PDSCH to DAB  ABB  O  EPRE ratio of PDSCH to DAB  ABB  O  BERE ratio of PDSCH to DAB  ABB  O  ABB  O  EPRE ratio of PDSCH to DAB  ABB  O  ABB  ABB		of PBCH DMRS	dB				
EPRE ratio of PBCH to		of DDCII to	4D				
EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDSCH DMRS OSS  EPRE ratio of PDSCH to DMRS to SSS  EPRE ratio of OCNG DMRS DEPRE ratio of OCNG DMRS DEPRE ratio of OCNG DMRS DEPRE ratio of OCNG DMRS  EPRE ratio of OCNG DMRS DEPRE ratio of OCNG DMRS DEPRE ratio of OCNG DMRS  SNR Config 1, 4 DW DWRS DWRS  SNR Config 3, 6 DWRS DWRS DWRS DWRS DWRS DWRS DWRS DWRS			aв				
PBCH DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG DMRS  EPRE ratio of OCNG to OCNG DMRS  SNR  Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6 Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 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.			4B				
EPRE ratio of PDSCH odb DMRS to SSS  EPRE ratio of OCNG DMRS dB to SSS  EPRE ratio of OCNG to OCNG DMRS  EPRE ratio of OCNG to OCNG DMRS  EPRE ratio of OCNG to OCNG DMRS  SNR			uБ				
DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS dB to SSS  EPRE ratio of OCNG to OCNG DMRS  SNR			dB				
EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS dB to SSS  EPRE ratio of OCNG to OCNG DMRS  SNR Config 1, 4 dB 1 -7 -15  Config 2, 5 1 -7 -15  Config 3, 6 1 -7 -15  Config 3, 6 98  Propagation condition TDL-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 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.			45		0		
EPRE ratio of OCNG DMRS  EPRE ratio of OCNG to OCNG DMRS  SNR  Config 1, 4 dB 1 -7 -15  Config 2, 5 1 -7 -15  Config 3, 6 1 -7 -15  Config 2, 5 -98  Config 3, 6 -98  Propagation condition TDL-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.			dB				
EPRE ratio of OCNG to OCNG DMRS  SNR  Config 1, 4  Config 2, 5  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6  Propagation condition  Tol-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.	PDSCH DM	RS					
EPRE ratio of OCNG to OCNG DMRS  SNR  Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 4, 4 Config 4, 4 Config 4, 4 Config 5, 5 Config 6, 98 Config 7, 15 C	EPRE ratio	of OCNG DMRS	dB				
SNR   Config 1, 4   dB   1   -7   -15							
SNR  Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 3, 6 Config 2, 5 Config 3, 6 Config 4, 4 Config 4, 4 Config 5, 5 Config 5, 6 Config 6, 5 Config 7, 4 Config 7, 6 Config 1, 4 Config 7, 6 Config 1, 4 Config 7, 6 Config 3, 6 Config 7, 6 Config 1, 4 Config 7, 6 Config 3, 6 Config 7, 6 Config 1, 4 Config 7, 6 Config 3, 6 Config 7, 6 Config 1, 4 Config 7, 6 Config 3, 6 Config 7, 6 C			dB				
Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 Config 2, 5 Config 3, 6 Config 2, 5 Config 2, 5 Config 2, 5 Config 3, 6 Config 2, 5 Config 3, 6 Config 2, 5 Config					T		
Config 3, 6  Config 1, 4 Config 2, 5 Config 3, 6  Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.	SNR		dB				
Noc Config 1, 4 dBm/15KHz -98 Config 2, 5 -98 Propagation condition TDL-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.				-	-		
Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.				1		-15	
Config 3, 6   -98	$N_{aa}$		dBm/15KHz				
Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.  Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.  Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG. SNR levels correspond to the signal to noise ratio over the SSS REs.	000						
<ul> <li>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.</li> <li>Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.</li> <li>Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.</li> <li>Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.</li> <li>Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.</li> <li>Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.</li> <li>Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.</li> </ul>	Duananatian	<u> </u>		_		1_	
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.							
<ul> <li>Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.</li> <li>Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.</li> <li>Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.</li> <li>Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.</li> <li>Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.</li> <li>Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.</li> </ul>							
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.							
<ul> <li>Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.</li> <li>Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.</li> <li>Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.</li> <li>Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.</li> <li>Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.</li> </ul>			3 for OOI reporting	g are assigned to	the OL phor to th	o start or time	
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.			ce set configuration	on for CSI reportir	ng are assigned to	the UE prior to	
<ul> <li>T1.</li> <li>Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.</li> <li>Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.</li> <li>Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.</li> </ul>				•	5 5	•	
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 4: N	leasurement gap o	onfiguration is ass	signed to the UE	prior to the start o	of time period	
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 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.			r 3 filtering related	d parameters are	configured prior to	o the start of	
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.			DD00111 115				
					part of OCNG.		
					CNIDO		
respectively in figure A.4.5.1.7.1-1.				is denoted as a	SINK I, SINK∠ and	SINKS	
Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one				ing a LIF which s	innorts 2RX on a	t least one	
band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is							
specified in section A.3.6.1.1.					arao, aro orare du	9 10 10	

Table A.4.5.1.7.1-3A: Void

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

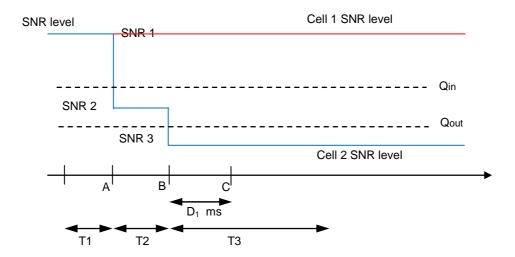


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

#### A.4.5.1.7.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C ( $D_1$  after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

### A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.8.1-1 shows the

variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to pass in one of the supported test configurations in FR1

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

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		
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD		
	Config 2, 5		CR.1.1 TDD		
	Config 3, 6		CR.2.1 TDD		
Dedicated CORESET	Config 1, 4		CCR.1.1 FDD		
Reference 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
CCL DC for DLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
CSI-RS for RLM	Config 3, 6		
	9 .		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCC	H/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length Correlation Matrix and Ante	nna Configuration		Normal 2x2 Low
Correlation Matrix and Arite	Tilla Coriliguration		ZXZ LOW
Out of sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols	205	+
	Aggregation level	CCE dB	8 4
	Ratio of hypothetical PDCCH RE energy to	uБ	4
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy	QD.	· ·
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols	CCE	4
	Aggregation level Ratio of hypothetical	CCE dB	0
	PDCCH RE energy to	uБ	0
	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		
DDV	REG bundle size		6
DRX Gap pattern ID			DRX.3 gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311	Config 4 4		1 CSL BS 1.1 EDD
CSI-RS for reporting	Config 1, 4 Config 2, 5		CSI-RS.1.1 FDD CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1	Coming 5, 5	S	0.2
T2		S	0.2
T3		s	1.24
T4		S	0.2
T5		S	1.88
T6		S	1.84
	CH is not transmitted after T1 sta	arts.	
Note 2: E-UTRAN is in n	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

P	arameter	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio o	of PDCCH DMRS to	dB			0		
EPRE ratio o	of PDCCH to PDCCH	dB					
EPRE ratio o	of PBCH DMRS to	dB					
EPRE ratio o	of PBCH to PBCH	dB					
EPRE ratio o	of PSS to SSS	dB					
EPRE ratio o	of PDSCH DMRS to	dB	0				
EPRE ratio o	of PDSCH to PDSCH	dB					
EPRE ratio o	of OCNG DMRS to	dB					
EPRE ratio o	of OCNG to OCNG	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
$N_{oc}$	Config 1, 4	dBm/15KHz		•	-98		
00	Config 2, 5				-98		-
	Config 3, 6		-98				
Propagation	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 specified in section A.3.6.1.1.

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

	Field			
	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

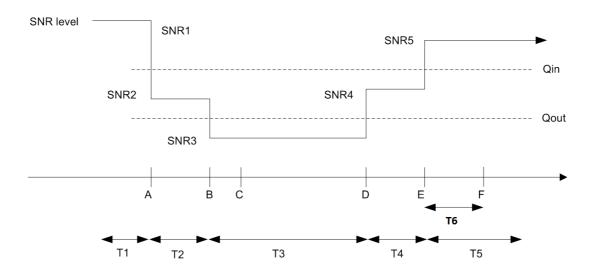


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

### 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 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.1.1-2 and A.4.5.2.1.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.1.1-4 below. And the E-UTRAN

cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. CORESET indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only 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	
Id		OFF	
T1	S	10	

Table A.4.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Param	eter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW <sub>channel</sub>	Config 1,4		10: N <sub>RB,c</sub> = 52
	Config 2,5		10: N <sub>RB,c</sub> = 52
	Config 3,6	]	40: N <sub>RB,c</sub> = 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
Configuration			
DDCCU D (	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
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and A	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	SS		
EPRE ratio of PBCH DM	RS to SSS		
EPRE ratio of PBCH to F	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	dB	0
EPRE ratio of PDSCH to	PDSCH		
EPRE ratio of OCNG DN	IRS to SSS(Note		
1)			
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1)			
Noc <sup>Note 2</sup>		dBm/15	-104
		kHz	-104
SS-RSRP Note 3		dBm/15	-87
		kHz	-01
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Io <sup>Note3</sup>		dBm/	-58.96
	Config 1,2,4,5	9.36MHz	-30.90
	Config 2.6	dBm/	52.06
Config 3,6		38.16MHz	-52.86
Time offset to Cell1 Note 4		μs	3 for intra-band EN-DC,
			33 for inter-band EN-DC
Propagation Condition		1	AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modeled as AWGN of appropriate power for N₀c to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are
	not settable parameters themselvess.
Note 4:	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

И	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 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is or	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.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.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

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 <sub>channel</sub>	Config 1,4		10: N <sub>RB,c</sub> = 52
	Config 2,5		10: N <sub>RB,c</sub> = 52
	Config 3,6		40: N <sub>RB,c</sub> = 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
	Config 1,4		SR.1.1 FDD

	0 " 0 -	1	00.44.700
PDSCH Reference	Config 2,5		SR.1.1 TDD
measurement channel	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	1	CCR.1.1 TDD
	Config 3,6	1	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	1	SSB.2 FR1
Correlation Matrix and A			1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to F			
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to PDCCH DMRS		1	
EPRE ratio of PDSCH DMRS to SSS		dB	0
EPRE ratio of PDSCH to PDSCH		1	
EPRE ratio of OCNG DMRS to SSS(Note		1	
1)			
EPRE ratio of OCNG to OCNG DMRS		-	
(Note 1)			
Noc <sup>Note 2</sup>		dBm/15	
1 - 300		kHz	-104
SS-RSRP Note 3		dBm/15	
		kHz	-87
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Io <sup>Note3</sup>	T	dBm/	
	Config 1,2,4,5	9.36MHz	-58.96
		dBm/	
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note	Config 1,2,4,5	μς	500
4		μο	
	Config 3,6	†	250
Propagation Condition			AWGN
1 Topagation Condition		1	7.11.014

Note 1: OCNG shall be 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.4.5.2.2.1-4: Void

### A.4.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.2.2-1.

Table A.4.5.2.2.2-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption length X	
μ.	length (ms)	Async	
0	1	2	
1	0.5	2	

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.2.3 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

#### A.4.5.2.3.1 Test Purpose and Environment

T The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.2.3.1-1. Supported test configurations for NR SCell are shown in table A.4.5.2.3.1-1A. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2, A.4.5.2.3.1-3 and A.4.5.2.3.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are 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 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. 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 for LTE PCell and NR PSCell

	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 1:	The UE is only i	required to be tested in one of the supported test configurations
Note 2:		required to be tested in one with smallest aggregated channel bandwidth from supported ons which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test

Table A.4.5.2.3.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

Configscell		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	equired to be tested in one of the supported test configurations
Note 2:	e 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test configuration	

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, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
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 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ma	640	
(measCycleSCell)	ms	040	
T1	S	10	

Table A.4.5.2.3.1-3: NR cell specific test parameters for NR PSCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	eter	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 <sub>channel</sub>	Config 1,4		Note 8
	Config 2,5		Note 8
	Config 3,6		Note 8
BW <sub>occupied</sub>	Config 1,4	RB	52 Note 6
	Config 2,5		52 Note 6
	Config 3,6		106 Note 7
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	1	DLBWP.1.1
	Config 3,6	1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1

Dedicated UL BWP   Config 1,4   ULBWP.1.1		Config 3,6	1	ULBWP.0.1
Configuration	Dedicated III RWP	_		
Config 3.6	<u> </u>		-	_
PDSCH Reference measurement channel	Comigaration		+	
Measurement channel   Config 2,5   Config 3,6   SR.2.1 TDD	DDSCH Peterence	_		_
RMSI CORESET			-	
RMSI CORESET   Config 1,4   Config 2,5   Config 3,6   CR.1.1 TDD	measurement channel		-	_
Description   Config 2.5   CR.1.1 TDD	DMCLCODECET	_		
Config 3,6   CR.2.1 TDD		•	-	
PDCCH CORESET parameters	parameters	•		
Config 2,5   Config 3,6   CCR.1.1 TDD	DD COLL CODECET			
Config 3,6   CCR.2.1 TDD		•		
TRS configuration	parameters	•		
Config 2,5   Config 3,6   TRS.1.1 TDD		_		
Config 3,6   TRS.1.2 TDD     OCNG Patterns   Config 1,2,4,5   OP.1 Note 6     Config 3,6   OP.1 Note 7     SMTC Configuration   SMTC.1     TCI state   TCI.State.0     SSB Configuration   Config 1,2,4,5   Config 3,6     Correlation Matrix and Antenna   SSB.1 FR1     Correlation Matrix and Antenna   Configuration     EPRE ratio of PSS to SSS     EPRE ratio of PBCH DMRS to SSS     EPRE ratio of PBCH DMRS to SSS     EPRE ratio of PBCH DMRS to SSS     EPRE ratio of PDCCH DMRS to SSS     EPRE ratio of PDSCH DMRS to SSS     EPRE ratio of PDSCH to PDCCH DMRS     EPRE ratio of OCNG DMRS to SSS     EPRE ratio of PDSCH to PDSCH     EPRE ratio of OCNG DMRS to SSS     EPRE ratio of OCNG DMRS to SSS     EPRE ratio of PDSCH to PDSCH     EPRE ratio of OCNG DMRS to SSS     EPRE ratio of PDSCH to PDSCH     EPRE ratio of PDSCH to PD	TRS configuration			TRS.1.1 FDD
Config 1,2,4,5				TRS.1.1 TDD
Config 3,6   OP.1 Note 7		Config 3,6		
SMTC Configuration	OCNG Patterns	Config 1,2,4,5		
TCI state		Config 3,6		OP.1 Note 7
Configuration   Config 1,2,4,5   Config 3,6   SSB.1 FR1	SMTC Configuration			SMTC.1
Config 3,6   SSB.2 FR1	TCI state			TCI.State.0
Config 3,6   SSB.2 FR1	SSB Configuration	Config 1,2,4,5		SSB.1 FR1
Configuration           EPRE ratio of PSS to SSS           EPRE ratio of PBCH DMRS to SSS           EPRE ratio of PDCCH DMRS to SSS           EPRE ratio of PDCCH DMRS to SSS           EPRE ratio of PDCCH to PDCCH DMRS           EPRE ratio of PDSCH DMRS to SSS           EPRE ratio of OCNG DMRS to SSS Note 1           EPRE ratio of OCNG DMRS to SSS Note 1           EPRE ratio of OCNG to OCNG DMRS Note 1           Noc Note 2         dBm/15 kHz           SS-RSRP Note 3         dBm/15 kHz           E³/lot         dB         17           Es/Noc         dB         17           Io Note3         dB         17           Io Note3         Config 1,2,4,5         dBm/9,36MHz         -58.96           Config 3,6         dBm/38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC, 33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -			1	SSB.2 FR1
EPRE ratio of PSS to SSS         EPRE ratio of PBCH DMRS to SSS           EPRE ratio of PBCH to PBCH DMRS         AB           EPRE ratio of PDCCH to PDCCH DMRS         AB           EPRE ratio of PDSCH DMRS to SSS         AB           EPRE ratio of PDSCH DMRS to SSS         AB           EPRE ratio of OCNG DMRS to SSS Note 1         AB           EPRE ratio of OCNG DMRS Note 1         AB           EPRE ratio of OCNG to OCNG DMRS Note 1         AB           Es/Iot         AB         AB           Ês/Noc         AB         AB           IoNote3         Config 1,2,4,5         AB           Config 3,6         AB         AB           Time offset to Cell1 Note 4         AB         -52.86           Time offset to Cell2 Note 5         AB         -52.86	Correlation Matrix and Ar	ntenna		1x2 Low
EPRE ratio of PSS to SSS         EPRE ratio of PBCH DMRS to SSS           EPRE ratio of PBCH to PBCH DMRS         AB           EPRE ratio of PDCCH to PDCCH DMRS         AB           EPRE ratio of PDSCH DMRS to SSS         AB           EPRE ratio of PDSCH DMRS to SSS         AB           EPRE ratio of OCNG DMRS to SSS Note 1         AB           EPRE ratio of OCNG DMRS Note 1         AB           EPRE ratio of OCNG to OCNG DMRS Note 1         AB           Es/Iot         AB         AB           Ês/Noc         AB         AB           IoNote3         Config 1,2,4,5         AB           Config 3,6         AB         AB           Time offset to Cell1 Note 4         AB         -52.86           Time offset to Cell2 Note 5         AB         -52.86	Configuration			
EPRE ratio of PBCH DMRS to SSS         EPRE ratio of PBCH to PBCH DMRS           EPRE ratio of PDCCH DMRS to SSS         EPRE ratio of PDCCH to PDCCH DMRS           EPRE ratio of PDSCH DMRS to SSS         EPRE ratio of PDSCH to PDSCH           EPRE ratio of OCNG DMRS to SSS Note 1         BPRE ratio of OCNG DMRS Note 1           EPRE ratio of OCNG to OCNG DMRS Note 1         Characteristic Skills           EPRE ratio of OCNG to OCNG DMRS Note 1         Characteristic Skills           EPRE ratio of OCNG to OCNG DMRS Note 1         Characteristic Skills           EPRE ratio of OCNG to OCNG DMRS Note 1         Characteristic Skills           Bes/lot         dBm/15           kHz         -87           Es/lot         dB         17           Es/lot         dB         17           Es/Noc         dB         17           IoNote3         dBm/9.36MHz         -58.96           Config 3,6         dBm/38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC, 33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -		S		
EPRE ratio of PBCH to PBCH DMRS         EPRE ratio of PDCCH DMRS to SSS           EPRE ratio of PDCCH to PDCCH DMRS         dB           EPRE ratio of PDSCH DMRS to SSS         EPRE ratio of PDSCH to PDSCH           EPRE ratio of OCNG DMRS to SSS Note 1         dBm/15 kHz           EPRE ratio of OCNG to OCNG DMRS Note 1         4           SS-RSRP Note 2         dBm/15 kHz           SS-RSRP Note 3         dBm/15 kHz           Es/lot         dB         17           Ēs/Noc         dB         17           IoNote3         Config 1,2,4,5         dBm/9,36MHz           Config 3,6         dBm/38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC,33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -	EPRE ratio of PBCH DM	RS 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 OCNG DMRS to SSS Note 1         EPRE ratio of OCNG DMRS Note 1         EPRE ratio of OCNG to OCNG DMRS Note 1         EPRE ratio of OCNG to OCNG DMRS Note 1         ES-RSRP Note 3       dBm/15 kHz         SS-RSRP Note 3       dBm/15 kHz         Es/lot       dB       17         Es/Noc       dB       17         IoNote3       dBm/9 36MHz       -58.96         Config 3,6       dBm/9 38.16MHz       -52.86         Time offset to Cell1 Note 4       µs       3 for intra-band EN-DC, 33 for inter-band EN-DC         Time offset to Cell2 Note 5       µs       -			-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			-	
EPRE ratio of PDSCH DMRS to SSS           EPRE ratio of OCNG DMRS to SSS Note 1         4           EPRE ratio of OCNG to OCNG DMRS Note 1         dBm/15 kHz           Noc Note 2         dBm/15 kHz           SS-RSRP Note 3         dBm/15 kHz           Es/lot         dB         17           Ês/Noc         dB         17           IoNote3         Config 1,2,4,5         dBm/9.36MHz         -58.96           Config 3,6         dBm/9.38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC, 33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -			dB	0
			1 42	, and the second
EPRE ratio of OCNG DMRS to SSS Note 1           EPRE ratio of OCNG to OCNG DMRS Note 1           Noc Note 2         dBm/15 kHz         -104           SS-RSRP Note 3         dBm/15 kHz         -87           Ês/lot         dB         17           Ês/Noc         dB         17           IoNote3         Config 1,2,4,5         dBm/9.36MHz         -58.96           Config 3,6         dBm/9.38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC, 33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -				
EPRE ratio of OCNG to OCNG DMRS Note 1           Noc Note 2         dBm/15 kHz         -104           SS-RSRP Note 3         dBm/15 kHz         -87           Ês/Iot         dB         17           Ês/Noc         dB         17           IoNote3         Config 1,2,4,5         dBm/ 9.36MHz         -58.96           Config 3,6         dBm/ 38.16MHz         -52.86           Time offset to Cell1 Note 4         μs         3 for intra-band EN-DC, 33 for inter-band EN-DC           Time offset to Cell2 Note 5         μs         -			-	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		DOING DIVING	dRm/15	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	INOC			-104
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-RSRP Note 3		dBm/15	67
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			kHz	-87
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			dB	17
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			dB	17
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Io <sup>Note3</sup>	Config 1.2.4.5		-58.96
i 33 for inter-band EN-DC Time offset to Cell2 Note 5 μs -		Config 3,6		-52.86
·			μs	
Propagation Condition AWGN	Time offset to Cell2 Note 5		μs	-
	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 modeled as
	AWGN of appropriate power for N₀c to be fulfilled within BWoccupied.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselvess.
Note 4:	Receive time difference of signals received between subframe timing
	boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE
	antenna connector including time alignment error between the two cells
Note 5:	Receive time difference between slot boundaries of signals received from
	the two cells at the UE antenna connector including time alignment error
	between the two cells.
Note 6:	All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52
	RBs) from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.
Note 7:	All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz, 106
	RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.
Note 8:	N <sub>RB,c</sub> . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured
	BW <sub>channel</sub> .

Table A.4.5.2.3.1-4: NR cell specific test parameters for NR SCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell3
Frequency Range			FR1
Duplex mode	Config <sub>SCell</sub> 1		FDD
	Configscell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
	Configscell 2		TDDConf.1.1
	Config <sub>SCell</sub> 3		TDDConf.2.1
BW <sub>channel</sub>	Config <sub>SCell</sub> 1		Note 8
	Configscell 2		Note 8
	Configscell 3		Note 8
BW <sub>occupied</sub>	Configscell 1	RB	52 Note 6
	Config <sub>SCell</sub> 2		52 Note 6
	Config <sub>SCell</sub> 3		106 Note 7
Initial DL BWP	Config <sub>SCell</sub> 1		DLBWP.0.1
Configuration	Configscell 2		DLBWP.0.1
	Configscell 3		DLBWP.0.1
Dedicated DL BWP	Configscell 1		DLBWP.1.1
Configuration	Config <sub>SCell</sub> 2		DLBWP.1.1
	Configscell 3		DLBWP.1.1
Initial UL BWP	Configscell 1		ULBWP.0.1
Configuration	Configscell 2		ULBWP.0.1
	Configscell 3		ULBWP.0.1
Dedicated UL BWP	Configscell 1		ULBWP.1.1
Configuration	Configscell 2		ULBWP.1.1
	Configscell 3		ULBWP.1.1
PDSCH Reference	Configscell 1		-
measurement channel	Configscell 2		-
	Configscell 3	<u></u>	-
RMSI CORESET	Config <sub>SCell</sub> 1		CR.1.1 FDD
parameters	Configscell 2		CR.1.1 TDD

			T	
	-	Configscell 3		CR.2.1 TDD
	PDCCH CORESET Configscell 1			CCR.1.1 FDD
parameters Configscell 2				CCR.1.1 TDD
Configscell 3			CCR.2.1 TDD	
TRS config	guration	Config <sub>SCell</sub> 1		TRS.1.1 FDD
		Config <sub>SCell</sub> 2		TRS.1.1 TDD
		Config <sub>SCell</sub> 3		TRS.1.2 TDD
OCNG Pat	terns	Configscell 1,2		OP.1 Note 6
		Configscell 3		OP.1 Note 7
SMTC Cor	nfiguration	1		SMTC.1
TCI state				TCI.State.0
SSB Confi	guration	Configscell 1,2		SSB.1 FR1
		Configscell 3		SSB.2 FR1
Correlation	Matrix and Ar	_		1x2 Low
Configurati				-
	of PSS to SS	S		
	of PBCH DMI			
	of PBCH to P			
	of PDCCH DI			
		PDCCH DMRS	dB	0
	of PDSCH DI		, GD	ŭ
	of PDSCH to		-	
		RS to SSS Note 1		
		OCNG DMRS Note 1		
N <sub>oc</sub> Note 2	or OCING to C	DOING DIVING	dBm/15 kHz	-104
SS-RSRP Note 3			dBm/15 kHz	-87
Ê <sub>s</sub> /I <sub>ot</sub>				-67 17
Ê <sub>s</sub> /N <sub>oc</sub>			dB	
Io <sup>Note3</sup>		Configuration	dB	17
10,40,60		Configscell 1,2	dBm/9.36MHz	-58.96
Time a effect	A Calla Note 4	Configscell 3	dBm/38.16MHz	-52.86
I ime offse	t to Cell1 Note 4		μs	3 + Time offset to Cell2 for intra-band EN-DC,
				33 + Time offset to Cell2
				for inter-band EN-DC
Time offse	t to Cell2 Note 5		μs	3
Propagation Condition				AWGN
		e used such that bot	th cells are fully allo	cated and a constant total
transmitted power spectral density				
Note 2: Interference from other cells and n				
	assumed to be constant over subc			
	AWGN of appropriate power for Noc to b			
Note 3: SS-RSRP and lo levels have been				•
	purposes. They are not settable pa			-
Note 4: Receive time difference of signals				
of E-UTRA PCell and slot timing b				
		_	t error between the	
				gnals received from the
1	two calls at the LIF antenna connector including time alignment every between			

from  $F_{C,low}$ , and lo is independent of the  $BW_{channel}$  configured.

from F<sub>C,low</sub>, and Io is independent of the BW<sub>channel</sub> configured.

two cells at the UE antenna connector including time alignment error between

All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs)

All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs)

N<sub>RB,c</sub>. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

the two cells.

Note 6:

Note 7:

Note 8:

### 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.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell 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 in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-2.

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	2 + SMTC duration
1	0.5	2 + SMTC duration

For synchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 1 subframe.

For synchronous intra-band EN-DC, the UE is only allowed to cause an interruption on E-UTRA PCell no earlier than 1 subframe before an SMTC and no later than 1 subframe after the SMTC. The interruption on E-UTRA PCell shall not exceed SMTC duration + 2 subframes.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

#### A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.2.4.1-1. Supported test configuration for NR SCell are shown in table A.4.5.2.4.1-1. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2, A.4.5.2.4.1-3 and A.4.5.2.4.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are 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 Cell2and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. 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 for LTE PCell and NR PSCell

	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 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combinatio	ns which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test
	configuration,	

Table A.4.5.2.4.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

Configscell		Description		
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode		
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode		
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only required to be tested in one of the supported test configurations			
Note 2:	2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supporte band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test configuration			

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, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
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 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		J	
SCell measurement cycle	ms	640	
(measCycleSCell)	1110	040	
T1	S	10	

Table A.4.5.2.4.1-3: NR cell specific test parameters for NR PSCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Paramete	r	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 <sub>channel</sub>	Config 1,4		Note 8
	Config 2,5		Note 8
	Config 3,6		Note 8
BW <sub>occupied</sub>	Config 1,4	RB	52 Note 6
	Config 2,5		52 Note 6
	Config 3,6		106 Note 7
Initial BWP Configuration	Config 1,4		DLBWP.0.1
	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns	Config 1,2,4,5		OP.1 Note 6
000 0 6 6	Config 3,6		OP.1 Note 7
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
01470.0	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
Configuration	enna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH to PR			
EPRE ratio of PBCH to PE			
EPRE ratio of PDCCH by		dB 0	
EPRE ratio of PDCCH to F			l U
EPRE ratio of PDSCH by			
EPRE ratio of PDSCH to F			
EPRE ratio of OCNG DMF	CNC DMDC Note 1		
	CING DIVIKS 1000 1	dPm/4F11=	404
Noc Note 2		dBm/15 Hz	-104
SS-RSRP Note 3		dBm/15 kHz	-87

Ê <sub>s</sub> /I <sub>ot</sub>			dB	17
Ê <sub>s</sub> /N <sub>oc</sub>			dB	17
Io <sup>Note3</sup>		Config 1,2,4,5	dBm/9.36MHz	-58.96
		Config 3,6	dBm/38.16MHz	-52.86
Time offs	et to Cell1 Note 4	Config 1,2,4,5	μs	500
		Config 3,6	·	250
Time offs	et to Cell2 Note 5		μs	-
Propagat	ion Condition		·	AWGN
Note 1:	OCNG shall be	used such that bot	th cells are fully allo	cated and a constant
	total transmitted	power spectral de	ensity is achieved fo	r all OFDM symbols.
Note 2:	Interference from	n other cells and r	noise sources not sp	ecified in the test is
	assumed to be of	constant over subc	carriers and time and	d shall be modeled as
	AWGN of appro	priate power for N	oc to be fulfilled with	in BW <sub>occupied</sub> .
Note 3:	SS-RSRP and lo	o levels have beer	n derived from other	parameters for
	information purp	oses. They are no	ot settable paramete	rs themselvess.
Note 4:	Receive time dif	ference of signals	received between s	subframe timing
	boundary of E-U	TRA PCell and slo	ot timing boundary of	of PSCell at the UE
	antenna connec	tor including time	alignment error betv	veen the two cells
Note 5:	Receive time dif	ference between s	slot boundaries of si	gnals received from
	the two cells at t	he UE antenna co	nnector including tir	me alignment error
	between the two			
Note 6:	All UL/DL transn	nission shall be co	onfined within BWocc	<sub>upied</sub> (i.e. 10 MHz, 52
	RBs) from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.			el configured.
Note 7:	All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106			<sub>upied</sub> (i.e. 40 MHz, 106
	RBs) from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.			
Note 8: N <sub>RB,c</sub> . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured			vith configured	
	BW <sub>channel</sub> .			

Table A.4.5.2.4.1-4: NR cell specific test parameters for NR SCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Paramete	r	Unit	Cell3
Frequency Range			FR1
Duplex mode Configscell 1			FDD
	Configscell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
	Configscell 2		TDDConf.1.1
	Configscell 3		TDDConf.2.1
BW <sub>channel</sub>	Config <sub>SCell</sub> 1		Note 8
	Config <sub>SCell</sub> 2		Note 8
	Configscell 3		Note 8
BW <sub>occupied</sub>	Configscell 1	RB	52 Note 6
	Configscell 2		52 Note 6
	Configscell 3		106 Note 7
Initial BWP Configuration	nitial BWP Configuration Configscell 1		DLBWP.0.1
	Config <sub>SCell</sub> 2		DLBWP.0.1
	Configscell 3		DLBWP.0.1
Dedicated DL BWP	Configscell 1		DLBWP.1.1
Configuration	Configscell 2		DLBWP.1.1
	Configscell 3		DLBWP.1.1
Initial UL BWP	Config <sub>SCell</sub> 1		ULBWP.0.1
Configuration	Config <sub>SCell</sub> 2		ULBWP.0.1
	Configscell 3		ULBWP.0.1
Dedicated UL BWP	Configscell 1		ULBWP.1.1
Configuration	Configscell 2		ULBWP.1.1
	Configscell 3		ULBWP.1.1
PDSCH Reference	Config <sub>SCell</sub> 1		-
measurement channel	Config <sub>SCell</sub> 2		-
	Configscell 3		-

Note 6:

Note 7: Note 8:

RMSI CC				CR.1.1 FDD
paramete	ers	Configscell 2		CR.1.1 TDD
		Configscell 3		CR.2.1 TDD
PDCCH	CORESET	Configscell 1		CCR.1.1 FDD
paramete	ers	Configscell 2		CCR.1.1 TDD
		Configscell 3		CCR.2.1 TDD
TRS con	figuration	Config <sub>SCell</sub> 1		TRS.1.1 FDD
	•	Configscell 2		TRS.1.1 TDD
		Configscell 3		TRS.1.2 TDD
OCNG P	atterns	Configscell 1,2		OP.1 Note 6
		Configscell 3		OP.1 Note 7
SSB Cor	nfiguration	Configscell 1,2		SSB.1 FR1
000 001	ingulation	ConfigsCell 3		SSB.2 FR1
SMTC C	onfiguration	Comigscell o		SMTC.1
TCI state				TCI.State.0
	on Matrix and Ant	anna		1x2 Low
		tilla		IXZ LUW
Configura	tio of PSS to SSS			
	tio of PBCH DMR			
	tio of PBCH to PB			
	tio of PDCCH DM			_
	tio of PDCCH to F		dB	0
	tio of PDSCH DM			
EPRE ra	tio of PDSCH to F	DSCH		
EPRE ra	tio of OCNG DMR	S to SSS Note 1		
EPRE ra	tio of OCNG to O	CNG DMRS Note 1		
Noc Note 2			dBm/15 kHz	-104
SS-RSRI	P Note 3		dBm/15 kHz	-87
Ês/Iot			dB	17
Ês/Noc			dB	17
Io <sup>Note3</sup>		Configscell 1,2	dBm/ 9.36MHz	-58.96
		Configscell 3	dBm/ 38.16MHz	-52.86
Time offs	set to Cell1 Note 4	Configscell 1,2	μs	500 + Time offset to Cell2
		Configscell 3	,,,,	250 + Time offset to Cell2
Time offs	set to Cell2 Note 5	G G T T T T T T T T T T T T T T T T T T	μs	3
	tion Condition		μο	AWGN
Note 1:		used such that ha	th colle are fully alle	cated and a constant total
NOIG 1.			v is achieved for all (	
Note 2:				ecified in the test is
NOIG Z.				d shall be modeled as
			$_{\infty}$ to be fulfilled with	
Note 3:				parameters for information
INUIG J.			arameters themselv	
Note 4:				
Note 4: Receive time difference of signals in E-UTRA PCell and slot timing bour				
			ween the two cells	no or antenna connector
Note 5:				gnals received from the two
INUIG J.				ment error between the two
	cells at the OE a	antenna connector	moduling unit align	ment entri between the two
Nata C.	All III (DI transprincies chelles confined within DW (i.e. 40 MILE 50 DDs)			

All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs)

All UL/DL transmission shall be confined within BW $_{occupied}$  (i.e. 40 MHz, 106 RBs) from F $_{C,low}$ , and lo is independent of the BW $_{channel}$  configured.

N<sub>RB,c</sub>. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

from  $F_{C,low}$ , and lo is independent of the  $BW_{channel}$  configured.

#### 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.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell 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.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in 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	2 + SMTC duration
1	0.5	2 + SMTC duration

For asynchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 2 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

#### A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.5.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.5.1-2 and A.4.5.2.5.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRAN SCells is received at the UE antenna connector. 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	
	_	LTE PCeII + NR PSCeII Note 2	
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 or	nly required to be tested in one of the supported test configurations	
Note 2:	The duplex n	node of the LTE SCell is determined based on the band combination to be tested.	

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 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 SCell		Cell3	Deactivated SCell on E-UTRAN RF channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
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

Parameter Frequency Range		Unit	Cell2
			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 <sub>channel</sub>	Config 1,4	MHz	10: N <sub>RB,c</sub> = 52
	Config 2,5		10: N <sub>RB,c</sub> = 52
	Config 3,6		40: N <sub>RB,c</sub> = 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	1	ULBWP.0.1

Dedicated UL BWP	Config 1 4	1	ULBWP.1.1
Configuration	Config 1,4	_	
Configuration	Config 2,5	-	ULBWP.1.1
DD00H D-(	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4	4	SR.1.1 FDD
measurement channel	Config 2,5	4	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		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
, and the second	Config 3,6		SSB.2 FR1
Correlation Matrix and A			1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM		1	
EPRE ratio of PBCH to F	BCH DMRS	1	
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to			
EPRE ratio of PDSCH D		dB	0
EPRE ratio of PDSCH to		1	
EPRE ratio of OCNG DM		-	
1)	110 10 000(11010		
EPRE ratio of OCNG to 0	OCNG DMRS	-	
(Note 1)	SOITO DIVINTO		
Noc <sup>Note 2</sup>		dBm/15	
1400		kHz	-104
SS-RSRP Note 3		dBm/15	
55 1010		kHz	-87
Ês/lot		dB	17
Es/lot Ês/Noc		dB	17
lo <sup>Note3</sup>		dBm/	11
10	Config 1,2,4,5	9.36MHz	-58.96
	Config 3,6	dBm/ 38.16MHz	-52.86
Time offset to Cell1 Note 4		μs	3 for intra-band EN-DC,
			33 for inter-band EN-DC
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 modeled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
Note 4:	Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

### A.4.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. 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
μ μ	length (ms)	Sync	
0	1	1	1+SMTC duration
1	0.5	1	1+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.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

## A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.6.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.6.1-1 and A.4.5.2.6.1-2 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. 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
	LTE PCell + NR PSCell Note 2

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
Note 2:	The duplex mode of the LTE SCell is determined based on the band combination to be tested.

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, 3	One is NR RF channel and the other two
		1, 2, 3	are E-UTRAN RF channels
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 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1113	040	
T1	S	10	

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter		Unit	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 <sub>channel</sub>	Config 1,4		10: N <sub>RB,c</sub> = 52
	Config 2,5		10: N <sub>RB,c</sub> = 52
	Config 3,6		40: N <sub>RB,c</sub> = 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	1	SR.2.1 TDD
DMCI CODECET			CR.1.1 FDD
RMSI CORESET Config 1,4		=	_
parameters	Config 2,5	4	CR.1.1 TDD
DD00H 00DE0ET	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and Ai	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		
EPRE ratio of PDSCH D	MRS to SSS	dB	0
EPRE ratio of PDSCH to			
EPRE ratio of OCNG DM		1	
1)	,		
EPRE ratio of OCNG to 0	OCNG DMRS		
(Note 1)			
Noc <sup>Note 2</sup>		dBm/15	
		kHz	-104
SS-RSRP Note 3		dBm/15	07
		kHz	-87
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Io <sup>Note3</sup>		dBm/	
	Config 1,2,4,5	9.36MHz	-58.96
		dBm/	
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note	Config 1,2,4,5	μs	500
4	2011119 1,2,1,0	μο	
	Config 3,6	=	250
Propagation Condition	Coming 0,0		AWGN
Propagation Condition		<u> </u>	AVVOIN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

### 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 one interruption on PCell and one interruption on PSCell. 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	2
1	0.5	2

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	2 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.4.5.2.7 Void

## A.4.5.3 SCell Activation and Deactivation Delay

# A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

## A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.3.1.1-1 below. Supported test configurations for NR SCell are shown in table A.4.5.3.1.1-1A below. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently. 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 and A.4.5.3.1.1-4 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 +  $\frac{T_{\text{HARQ}} + T_{\text{activation\_time}} + T_{\text{CSI\_Reporting}}}{NR \text{ slot length}}$ , as defined in clause 8.3. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot  $m+1+\frac{T_{\text{HARQ}}}{NR \text{ slot length}}$  to slot  $m+1+\frac{T_{\text{HARQ}} + 3ms + T_X}{NR \text{ slot length}} + N_{\text{interruption}}$ , as defined in clause 8.3, where  $N_{\text{interruption}}$  is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe  $m_1+1+\frac{T_{\text{HARQ}}}{\text{EUTRA slot length}}$  to subframe  $m_2+1+\frac{T_{\text{HARQ}+3ms}+T_X}{\text{EUTRA slot length}} + N_{\text{interruption}}$ , where  $m_1$  and  $m_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and  $N_{\text{interruption}}$  is the interruption length given in TS 36.133 [14] section 7.32.

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  $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot  $n + 1 + \frac{T_{HARQ}}{NR \, slot \, length}$  to  $n + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe  $n_1 + 1 + \frac{T_{HARQ}}{EUTRA \, subframe \, length}$  to subframe  $n_2 + 1 + \frac{T_{HARQ} + 3ms}{EUTRA \, subframe \, length}$ , where  $n_1$  and  $n_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

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 for LTE PCell and NR PSCell

Co	nfig	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		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	s only required to be tested in one of the supported test configurations
Note 2:	The UE is	s only required to be tested in one with smallest aggregated channel bandwidth from supported
	band com	nbinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test
	configura	tion,

Table A.4.5.3.1.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

Configscell		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	equired to be tested in one of the supported test configurations		

Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW<sub>channel</sub>) defined in each test configuration,

Table A.4.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.1
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	1	During this time the UE shall activate the SCell.
Т3	s	1	During this time the UE shall deactivate the SCell.
Tharq	ms	k₁×NR slot length	k <sub>1</sub> 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]
Tcsl_Reporting	ms	15	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing timefor CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]  As specified in clause 4.3 of TS 38.213 [3]
I.	slot	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe},\mu} + 1$	73 Specified III clause 4.3 () 13 30.213 [3]

Table A.4.5.3.1.1-3: Cell specific test parameters for NR PSCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Parame	eter	Unit	Cell 2
SSB ARFCN			T1 T2 T3
SSB ARFUN	Config 1 4		freq1 FDD
Duplex mode	Config 1,4 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
	Config 1,4		Note 7
BW <sub>channel</sub>	Config 2,5	MHz	Note 7
	Config 3,6		Note 7
BWoccupied	Config 1,4	RB	52 Note 5
	Config 2,5		52 Note 5
	Config 3,6		106 Note 6
DL initial BWP	Config 1, 2, 3, 4,		
configuration	5, 6		DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3, 4,		DLBWP.1.1
configuration UL initial BWP	5, 6 Config 1, 2, 3, 4,		
configuration	5, 6		ULBWP.0.1
UL dedicated BWP	Config 1, 2, 3, 4,		ULBWP.1.1
configuration	5, 6		
DRX Cycle		ms	Not Applicable
PDSCH Reference measurement channel	Config 1,4		SR.1.1 FDD
	Config 2,5		SR.1.1 TDD
measurement charmer	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
Reference Channel	Config 2,5		CR.1.1 TDD
Treference Chairner	Config 3,6		CR.2.1 TDD
RMC CORESET	Config 1,4		CCR.1.1 FDD
Reference Channel	Config 2,5		CCR.1.1 TDD
Treference Griannier	Config 3,6		CCR.2.1 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	Config 1,2,4,5		OP.1 Note 5
	Config 3,6		OP.1 Note 6
SMTC configuration			SMTC.1
SSB configuration	Config 1,2,4,5		SSB.1 FR1
33B configuration	Config 3,6		SSB.2 FR1
CCL DC configuration	Config 1,4		CSI-RS.1.1 FDD
CSI-RS configuration for CSI reporting	Config 2,5		CSI-RS.1.1 TDD
	Config 3,6		CSI-RS.2.1 TDD
PDSCH/PDCCH	Config 1,2,4,5	kHz	15
subcarrier spacing	Config 3,6	NΠΔ	30
reportConfigType	Config 1-6		periodic
reportQuantity	Config 1-6		cri-RI-PMI-CQI
CSI reporting	Config 1,2,4,5	slot	5
periodicity	Config 2.6		
CSI reporting offeet	Config 1, 2, 4, 5	alat	10
CSI reporting offset	Config 1,2,4,5 Config 3,6	slot	2
EPRE ratio of PSS to SS		dB	0
21 / 22 / 30	ı	-	<u> </u>

			1			
	of PBCH DM					
	of PBCH to P					
	EPRE ratio of PDCCH DMRS to SSS					
	EPRE ratio of PDCCH to PDCCH DMRS					
	of PDSCH DI					
	of PDSCH to					
		IRS to SSS Note 1				
EPRE ratio	of OCNG to C	OCNG DMRS Note 1				
$N_{oc}^{}$ Note2			dBm/15kHz	-104		
λ/ Note2		Config 1,2,4,5	dBm/SCS	-104		
$N_{oc}^{}$ Note2		Config 3,6	UDIII/3C3	-101		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			dB	17		
$\hat{E}_s/N_{oc}$			dB	17		
SS-RSRP No	ote3	Config 1,2,4,5	dBm/SCS	-87		
		Config 3,6	ubiii/3C3	-84		
SCH_RP Note	e 3		dBm/15 kHz	-87		
IoNote3		Config 1,2,4,5	dBm/9.36MHz	-58.96		
		Config 3,6	dBm/38.16MHz	-52.87		
Propagation			-	AWGN		
	Matrix and Ar	ntenna	_	2x2 Low		
Configuratio				-		
				cated and a constant		
				r all OFDM symbols.		
		om other cells and n				
a	ssumed to be	e constant over subc	arriers and time and	d shall be modelled as		
		ropriate power for $\it N$				
		and SCH_RP levels purposes. They are		from other parameters eters themselves.		
Note 4: T		ources for CSI repor		the UE prior to the start		
Note 5: A	,					
Note 6: A		smission shall he co	nfined within RW	and actual accuracy (i A 40		
Note 6: All UL/DL transmission shall be confined within BW <sub>channel_actual-occupied</sub> (i.e. 40 MHz, 106 RBs) from Fc,low, and lo is independent of the BW <sub>channel</sub> configured.						
				vith configured BW <sub>channel</sub> .		

Table A.4.5.3.1.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Param	otor	Unit	Cell 3			
Parame	eter	Unit	T1	T2	T3	
SSB ARFCN				freq2		
Duplex mode	Configscell 1			FDD		
Duplex mode	Configscell 2,3		T1 T2 T3  freq2  FDD  TDD  Not Applicable  TDDConf.1.1  TDDConf.2.1  Note 7  Note 7			
	Configscell 1	Configscell 1 Not Applicable				
TDD configuration	Config <sub>SCell</sub> 2			TDDConf.1.1		
	Config <sub>SCell</sub> 3		TDDConf.2.1			
	Config <sub>SCell</sub> 1			Note 7		
BW <sub>channel</sub>	Configscell 2	MHz	Note 7			
	Config <sub>SCell</sub> 3		Note 7			
BW <sub>occupied</sub>	Config <sub>SCell</sub> 1	RB		52 Note 5		

1	0	]	52 Note 5
	Configscell 2		
	Config <sub>SCell</sub> 3		106 Note 6
DL initial BWP configuration	Config <sub>SCell</sub> 1-3		DLBWP.0.1
DL dedicated BWP configuration	Configscell 1-3		DLBWP.1.1
UL initial BWP configuration	3		ULBWP.0.1
UL dedicated BWP configuration	Config <sub>SCell</sub> 1-3		ULBWP.1.1
DRX Cycle		ms	Not Applicable
DD00UD (	Configscell 1		SR.1.1 FDD
PDSCH Reference	Config <sub>SCell</sub> 2		SR.1.1 TDD
measurement channel	Configscell 3		SR.2.1 TDD
	Configscell 1		CR.1.1 FDD
RMSI CORESET	Configscell 2		CR.1.1 TDD
Reference Channel	Configscell 3		CR.2.1 TDD
	Configscell 1		CCR.1.1 FDD
RMC CORESET	Configscell 2		CCR.1.1 TDD
Reference Channel	Configscell 3		CCR.2.1 TDD
	Configscell 3 Configscell 1		TRS.1.1 FDD
TDC configuration	Configscell 2		
TRS configuration			TRS.1.1 TDD
0010 5 "	Configscell 3		TRS.1.2 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 5
	Config <sub>SCell</sub> 3		OP.1 Note 6
SMTC configuration			SMTC.1
SSB configuration	Configscell 1,2		SSB.1 FR1
COB cornigaration	Configscell 3		SSB.2 FR1
CSI-RS configuration for CSI reporting	Configscell 1		CSI-RS.1.1 FDD
	Configscell 2		CSI-RS.1.1 TDD
CSI reporting	Configscell 3		CSI-RS.2.1 TDD
PDSCH/PDCCH	Configscell 1,2	ld la	15
subcarrier spacing	Config <sub>SCell</sub> 3	kHz	30
reportConfigType	Configscell 1-3		periodic
reportQuantity	Configscell 1-3		cri-RI-PMI-CQI
CSI reporting periodicity	Configscell 1,2	slot	5
correpaining parametry	Configscell 3		10
CSI reporting offset	Configscell 1,2	slot	2
corresponding entert	Configscell 3	0.01	4
EPRE ratio of PSS to SSS			T
EPRE ratio of PBCH DMR			
EPRE ratio of PBCH to PB			
EPRE ratio of PDCCH DM			
		٩D	0
EPRE ratio of PDCCH to F		dB	0
EPRE ratio of PDSCH DM			
EPRE ratio of PDSCH to F			
EPRE ratio of OCNG DMR	(S to SSS Note)		
EPRE ratio of OCNG to O	UNG DMRS Note 1		
$N_{oc}^{}$ Note2		dBm/15kHz	-104
$N_{_{OC}}$ Note2	Configscell 1,2	dBm/SCS	-104
oc	Configscell 3	UDIII/SCS	-101
$\hat{E}_{_{\!s}}/I_{_{\! m ot}}$		dB	17
$\hat{E}_s/N_{oc}$		dB	17
SS-RSRP <sup>Note3</sup>	Configscell 1,2	dBm/SCS	-87

	Config <sub>SCell</sub> 3		-84	
SCH_RP Note 3		dBm/15 kHz	-87	
Io <sup>Note3</sup>	Configscell 1,2	dBm/9.36MHz	-58.96	
10.1010	Configscell 3	dBm/38.16MHz	-52.87	
Propagation condition		-	AWGN	
Correlation Matrix and Antenna			2x2 Low	
Configuration		-	ZXZ 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 within BW<sub>occupied</sub>.
- Note 3: SS-RSRP, lo 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.]
- Note 5: All UL/DL transmission shall be confined within BW<sub>channel\_actual-occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- Note 6: All UL/DL transmission shall be confined within BW<sub>channel\_actual-occupied</sub> (i.e. 40 MHz, 106 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- Note 7: NRB.c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

### A.4.5.3.1.2 Test Requirements

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot m +  $\frac{T_{HARQ} + T_{activition\_time} + T_{CSI\_Reporting}}{NR \, slot \, length}$ ,  $T_{activation\_time} = T_{FirstSSB} + 5 ms$ , as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot  $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot  $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$  to  $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}+N_{\rm interruption}$ , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe  $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$  to subframe  $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}+N_{\rm interruption}$ , as defined in clause 8.3.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n +  $1 + \frac{T_{\text{HARQ}}}{NR \, slot \, length}$  to n +  $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{NR \, slot \, length}$ , as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe  $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, subframe \, length}$  to subframe  $n_2 + 1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{EUTRA \, subframe \, length}$ .

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot m +  $\frac{\text{T}_{\text{HARQ}} + T_{\text{activion\_time}} + T_{\text{CSI\_Reporting}}}{NR \, \text{slot} \, \text{length}} \text{ as defined in clause 8.3 then the UE shall use the next available}$  uplink resource for reporting the corresponding valid CSI.

# A.4.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 640ms SCell measurement cycle

### A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1. The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 640ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	640	

## A.4.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except  $T_{activation\_time}$  will be replaced with the value  $T_{FirstSSB\_MAX} + T_{rs} + 5ms$ .

#### A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

## A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in slot m +  $\frac{\text{THARQ} + T_{\text{activtion,time}} + T_{\text{CSI\_Reporting}}}{NR \text{ slot } length}$  as defined in clause 8.3 provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot  $m+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{NR \text{ slot length}}$  to slot  $m+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{NR \text{ slot length}} + N_{\text{interruption}}$ , as defined in clause 8.3, where  $N_{\text{interruption}}$  is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe  $m_1+1+\frac{T_{\text{HARQ}}}{EUTRA \text{ slot length}}$  to subframe  $m_2+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{EUTRA \text{ slot length}} + N_{\text{interruption}}$ , where  $m_1$  and  $m_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and  $N_{\text{interruption}}$  is the interruption length given in TS 36.133 [14] section 7.32.

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  $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$  as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot  $n + 1 + \frac{T_{HARQ}}{NR \ slot \ length}$  to  $n + 1 + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe  $n_1 + 1 + \frac{T_{HARQ}}{EUTRA \ subframe \ length}$  to subframe  $n_2 + 1 + \frac{T_{HARQ} + 3ms}{EUTRA \ subframe \ length}$ , where  $n_1$  and  $n_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

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 clause A.4.5.3.1.2 shall apply to this test case, except  $T_{activation\_time}$  will be replaced with the value  $T_{FirstSSB\ MAX} + T_{SMTC\ MAX} + 2*T_{rs} + 5$ ms as defined in clause 8.3.

## A.4.5.4 UE UL carrier RRC reconfiguration Delay

## A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4 : Void

#### A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell 3). For SCell, both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PSCell and SCell are given in Table A. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE. At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE. At the start of T2, a NR uplink is configured to UE through

*RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
Note 2 The UE	E is only required to be tested in one of the supported te E is only required to be tested in one with smallest aggre nations which is composed of CCs ≥ the bandwidth (BW	egated channel bandwidth from supported band

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1,2,3, 4, 5, 6, 7, 8, 9	1, 2, 3	Three radio channels are used for these two tests.
Active cell		Config 1,2,3, 4, 5, 6, 7, 8, 9	Cell 1: E-UTRAN PCell Cell 2: FR1 PSCell Cell 3: FR1 SCell	E-UTRAN PCell on RF channel number 1 FR1 PSCell on RF channel number 2 FR1 SCell on RF channel number 3
CP length		Config 1,2,3, 4, 5, 6, 7, 8, 9	Normal	

DRX		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Measurement gap pattern Id		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4, 5, 6, 7, 8, 9	0	L3 filtering is not used
T1	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T2	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T3	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	T3	T1	T2	Т3
Channel number		Conf 1, 2, 3, 4,		2			2	
Charmer number		5, 6, 7, 8, 9						
		Conf 1, 2, 3	N/A			N/A		
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1			TDD Conf.1.		
		Conf 7, 8, 9		TDD Conf.2.	.1	-	TDD Conf.2.	
		Conf 1, 2, 3		Note 6			Note 6	
BW <sub>channel</sub>	MHz	Conf 4, 5, 6		Note 6			Note 6	
		Conf 7, 8, 9		Note 6			Note 6	
BW <sub>occupied</sub>	RB	Conf 1, 2, 3		52 Note 4			52 Note 4	
		Conf 4, 5, 6		52 Note 4			52 Note 4	
		Conf 7, 8, 9		106 Note 5			106 Note 5	
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD			SR.1.1 FDD		
measurement		Conf 4, 5, 6		SR.1.1 TDE	)		SR.1.1 TDD	
channel as defined in A.3.1.1		Conf 7, 8, 9		SR 2.1 TDE	)		SR 2.1 TDD	
RMSI CORESET		Conf 1, 2, 3		CR.1.1 FDE	)	CR.1.1 FDD		
reference		Conf 4, 5, 6		CR.1.1 TDE	)		CR.1.1 TDD	
measurement		Conf 7, 8, 9						
channel as defined in A.3.1.2				CR.2.1 TDE	)	CR.2.1 TDD		
RMC CORESET		Conf 1, 2, 3	(	CCR.1.1 FD	D	CCR.1.1 FDD		)
reference		Conf 4, 5, 6	(	CCR.1.1 TD	D	(	CCR.1.1 TDE	)
measurement channel as defined in A.3.1.3		Conf 7, 8, 9		CCR.2.1 TD	D		CCR.2.1 TDE	)
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6	OP.1 Note 4				OP.1 Note 4	
		Config 7, 8, 9		OP.1 Note 5			OP.1 Note 5	
SSB configuration		Conf 1, 2, 3, 4, 5, 6		SSB.1 FR1			SSB.1 FR1	
<b>J</b>		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				
		Conf 1		TRS.1.1 FD	D		TRS.1.1 FDE	)
		Conf 2		TRS.1.1 FD			TRS.1.1 FDE	
		Conf 3		TRS.1.1 FD			TRS.1.1 FDE	
001.00 (		Conf 4		TRS.1.1 TD		TRS.1.1 TDD		
CSI-RS for tracking		Conf 5		TRS.1.1 TD			)	
		Conf 6		TRS.1.1 TD			TRS.1.1 TDD	
		Conf 7		TRS.1.2 TD			TRS.1.2 TDD	
		Conf 8		TRS.1.2 TD			TRS.1.2 TDD	

	1	Conf 9	-	TRS.1.2 TD	D	-	TRS.1.2 TDI	<u> </u>
DL initial BWP		Conf 1, 2, 3, 4,						
configuration		5, 6, 7, 8, 9	DLBWP.0.1				DLBWP.0.1	
DL dedicated BWP		Conf 1, 2, 3, 4,	DI DIVID 4.4			DI DWD 4.4		
configuration		5, 6, 7, 8, 9	DLBWP.1.1				DLBWP.1.1	
UL dedicated BWP		Conf 1, 2, 3, 4,	ULBWP.1.1				III D\\/D 4 4	
configuration		5, 6, 7, 8, 9		ULBWP.1.	ı		ULBWP.1.1	
EPRE ratio of PSS								
to SSS								
EPRE ratio of								
PBCH_DMRS to								
SSS								
EPRE ratio of PBCH								
to PBCH_DMRS								
EPRE ratio of								
PDCCH_DMRS to								
SSS	4							
EPRE ratio of	1							
PDCCH to	٩D	Conf 1, 2, 3, 4,		0			0	
PDCCH_DMRS	dB	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,		-102			-102	
	15kHz	5, 6, 7, 8, 9						
$N_{oc}$ Note 2	dBm/	Conf		-102			-102	
1 voc	SCS	1,2,3,4,5,6						
	303	Conf 7,8,9		-99			-99	
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
Ls / IV oc	ub	5, 6, 7, 8, 9						
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ Note 3	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
s / tot		5, 6, 7, 8, 9		_				
	dBm/	Conf	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3	SCS	1,2,3,4,5,6						
		Conf 7,8,9	-83	-83	-83	-83	-83	-83
	dBm/	Conf	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	9.36	1,2,3,4,5,6						
	MHz	04700	F4 0	F4 0	F4 0	F4.0	F4.0	F4 0
Io Note 3	dBm/	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	38.16							
Dropogotica	MHz	Conf 1 2 2 4		0/0/CN1			AWGN	
Propagation Condition	1	Conf 1, 2, 3, 4,		AWGN			AWGN	
Antenna	-	5, 6, 7, 8, 9 Conf 1, 2, 3, 4,		1 x 2			1 x 2	
configuration	1	5, 6, 7, 8, 9		ιXΖ			ΙΧΖ	
Corniguration	I.	J, U, I, O, B				l		

- NOTE 1: OCNG shall be 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 within BW-accupied.
- 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.
- NOTE 4: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- NOTE 5: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	Т3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4,		3			3	
		5, 6, 7, 8, 9						
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1	
		Conf 1, 4, 7		Note 6			Note 6	
BW <sub>channel</sub>	MHz	Conf 2, 5, 8		Note 6			Note 6	
		Conf 3, 6, 9		Note 6			Note 6	
BWoccupied	RB	Conf 1, 4, 7		52 Note 4			52 Note 4	
		Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5			106 Note 5	
		Conf 1, 4, 7	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A
PUSCH parameters for NR UL carrier		Conf 2, 5, 8	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A
		Conf 3, 6, 9	G- FR1- A3-14 in [13]	G-FR1- A3-14 in [13]	G-FR1- A3-14 in [13]	N/A	G-FR1- A3-14 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
PUSCH parameters for supplementary UL		Conf 1, 4, 7	N/A	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]

		Conf 2, 5, 8		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
				in [13]		[13]	[13]	[13]
		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
		, ,	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
				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]
		Conf 2, 5, 8					Table	
PUCCH parameters		00111 2, 0, 0				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
		COIII 3, 0, 9	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
			IN/A	IN/A	IN/A			
DD0011 (		0 (4 4 7		00 4 4 50		-2 in [13]		-2 in [13]
PDSCH reference		Conf 1, 4, 7		SR.1.1 FD			SR.1.1 FDD	
measurement		Conf 2, 5, 8	SR.1.1 TDD				SR.1.1 TDD	
channel as defined		Conf 3, 6, 9		SR 2.1 TD	D		SR 2.1 TDD	)
in A.3.1.1								
RMSI CORESET		Conf 1, 4, 7		CR.1.1 FD			CR.1.1 FDD	
reference		Conf 2, 5, 8		CR.1.1 TD	D		CR.1.1 TDD	)
measurement		Conf 3, 6, 9						
channel as defined				CR.2.1 TD	D		CR.2.1 TDD	)
in A.3.1.2								
RMC CORESET		Conf 1, 4, 7	(	CCR.1.1 FE	DD		CR.1.1 FDI	
reference		Conf 2, 5, 8	(	CCR.1.1 TE	DD	(	CR.1.1 TDI	)
measurement		Conf 3, 6, 9						
channel as defined		, ,	(	CCR.2.1 TE	DD		CR.2.1 TDI	)
in A.3.1.3								
OCNG Pattern Note 1		Conf 1, 2, 4, 5,		OP.1 Note 4	1		OP.1 Note 4	
OCNG Pattern New 1		7, 8		-			-	
		Conf 3, 6, 9		OP.1 Note 5	5		OP.1 Note 5	
		Conf 1, 2, 4, 5,		000 4 50	_		000 4 504	
SSB configuration		7,8		SSB.1 FR	1		SSB.1 FR1	
		Conf 3, 6, 9		SSB.2 FR	1		SSB.2 FR1	
		Conf 1, 2, 3, 4,			<u>-</u>			
SMTC configuration		5, 6, 7, 8, 9		SMTC.1			SMTC.1	
		Conf 1		TRS.1.1 FC	חר	-	TRS.1.1 FDI	,
		Conf 2		TRS.1.1 TE			RS.1.1 TDI	
		Conf 3		TRS.1.2 TE			RS.1.2 TDI	
CCL DC for two alide at		Conf 4		TRS.1.1 FC			RS.1.1 FDI	
CSI-RS for tracking		Conf 5		TRS.1.1 TE			RS.1.1 TDI	
		Conf 6		TRS.1.2 TD			RS.1.2 TDI	
		Conf 7		TRS.1.1 FD			RS.1.1 FDI	
		Conf 8		TRS.1.1 TD			TRS.1.1 TDI	
		Conf 9		TRS.1.2 TD	DD	7	TRS.1.2 TDI	)
DL initial BWP		Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1	
configuration		5, 6, 7, 8, 9		DLDVVF.U.	<u> </u>			
DL dedicated BWP		Conf 1, 2, 3, 4,			1		DI DW/D 4 4	·
configuration		5, 6, 7, 8, 9		DLBWP.1.	<u> </u>	<u> </u>	DLBWP.1.1	
UL dedicated BWP		Conf 1, 2, 3, 4,		LII DIAID 4	4		III DWD 4 4	
configuration		5, 6, 7, 8, 9		ULBWP.1.	1		ULBWP.1.1	
EPRE ratio of PSS		, , , -, -						
I ELLE ISSO OL LOO		1						
to SSS								
to SSS EPRE ratio of	dB	Conf 1, 2, 3, 4,		Ω			0	
to SSS EPRE ratio of PBCH_DMRS to	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		0			0	
to SSS  EPRE ratio of PBCH_DMRS to SSS	dB			0			0	
to SSS EPRE ratio of PBCH_DMRS to	dB			0			0	

EDDE((								
EPRE ratio of								
PDCCH_DMRS to								
SSS EDDE votio of								
EPRE ratio of								
PDCCH DMDS								
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								
	dBm/	Conf 1, 2, 3, 4,		400			400	
	15kHz	5, 6, 7, 8, 9		-102			-102	
$N_{oc}$ Note 2	dDm/	Conf 1, 2, 4, 5,	-102			-102		
	dBm/ SCS	7,8		-102			-102	
	303	Conf 3, 6, 9		-99			-99	
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
L <sub>s</sub> /IV <sub>oc</sub>	uБ	5, 6, 7, 8, 9	10	10	10	10	10	10
$\hat{E}_{s}/I_{ot}$ Note 3	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
L <sub>s</sub> / L <sub>ot</sub>	ub	5, 6, 7, 8, 9	.0	10	10	10	10	10
	dBm/	Conf 1, 2, 4, 5,	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3	SCS	7,8						
		Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
	dBm/	Conf 1, 2, 4, 5,	<b>57.0</b>	F7.0	57.0	57.0	57.0	57.0
	9.36	7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
lo Note 3	MHz	Conf 2 C 0						
	dBm/ 38.16	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	MHz		-31.0	-31.6	-51.6	-51.6	-51.6	-51.0
Propagation	IVIITZ	Conf 1, 2, 3, 4,					l	
Condition		5, 6, 7, 8, 9		AWGN			AWGN	
Antenna		Conf 1, 2, 3, 4,						
configuration		5, 6, 7, 8, 9	1 x 2 1 x 2					
NOTE 1: OCNG shall	l ha usad		le are fully	allocated	and a cons	tant total tra	nemitted no	wor

- NOTE 1: OCNG shall be 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 within  ${\sf BW}_{\sf occupied}$ .
- 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.
- NOTE 4: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- NOTE 5: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

## A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

## A.4.5.5 Beam Failure Detection and Link recovery procedures

# A.4.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

### A.4.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set  $q_0$  configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set  $q_1$ . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.1.1-1, A.4.5.5.1.1-2, A.4.5.5.1.1-3 and A.4.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set  $q_0$  in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.1.1-2 shows the variation of the downlink L1-RSRP 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 5 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 1.

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 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note: The UE is only required to pass in one of the supported test configurations in FR1

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	Comment
		Test 1	
Active E-UTRA PCell		Cell 1	
E-UTRA RF Channel Number		1	

Active DCC-II		1	Coll O	
Active PSCell	or		Cell 2	
RF Channel Numb			2	
Duplex mode	Config 1, 4		FDD TDD	
	Config 2, 3, 5, 6		טטו	
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
BWonamor	Config 2, 5	141112	10: NRB,c = 52	
	Config 3, 6		40: NRB,c =	
	3 5 mg 5, 5		106	
DL initial BWP	Config 1, 2,		DLBWP.0.1	
configuration	3, 4, 5, 6			
DL dedicated	Config 1, 2,		DLBWP.1.1	
BWP	3, 4, 5, 6			
configuration				
UL initial BWP	Config 1, 2,		ULBWP.0.1	
configuration	3, 4, 5, 6			
UL dedicated	Config 1, 2,		ULBWP.1.1	
BWP	3, 4, 5, 6			
configuration TDD	Config 1, 4		Not Applicable	
Configuration	Connig 1, 4		Not Applicable	
Configuration	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4		CR.1.1 FDD	
Reference	J 55g ., .		0	
Channel				
	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
Dedicated	Config 1, 4		CCR.1.1 FDD	
CORESET				
Reference				
Channel				
	Config 2, 5		CCR.1.1 TDD	
000	Config 3, 6		CCR.2.1 TDD	
SSB	Config 1, 4		SSB.3 FR1	
Configuration	Config 2 F		SSB.3 FR1	
	Config 2, 5 Config 3, 6		SSB.4 FR1	
SMTC	Config 1, 2,		SMTC.1	
Configuration	4, 5		SIVITO.1	
Configuration	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2,		15 KHz	
subcarrier	4, 5		101112	
spacing	, -			
	Config 3, 6		30 KHz	
PRACH	Config 1, 2,		Table A.3.8.2.2-	
Configuration	4, 5		1	
201111garation	Config 3, 6	:	Table A.3.8.2.2-	
	, , , , ,		1	
SSB Index assigne	ed as BFD RS		0	
(q <sub>0</sub> )				
SSB Index assigne	ed as CBD RS		1	
(q <sub>1</sub> )				
OCNG parameters	· · · · · · · · · · · · · · · · · · ·		OP.1	
CP length			Normal	
Correlation Matrix	and Antenna		2x2 Low	
Configuration	T = 0.1			
Beam failure	DCI format		1-0	

detection	Number of		2	
transmission	Control			
parameters	OFDM			
'	symbols			
	Aggregation	CCE	8	
	level	002	· ·	
	Ratio of	dB	0	
		ub	U	
	hypothetical			
	PDCCH RE			
	energy to			
	average			
	SSS RE			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	average			
	SSS RE			
	energy			
	DMRS		REG bundle	
	precoder		size	
	•		Size	
	granularity			
	REG bundle		6	
227	size		0==	
DRX			OFF	
Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSy	ncThreshold		absent	When the field is
				absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-	Config 1, 2,	dBm/	-98	Threshold used for
ThresholdSSB	4, 5	SCS		Qin LR SSB
	, -	kHz		
	Config 3, 6		-95	
powerControlOffse			db0	Used for deriving
powerodiniololise			abo	rsrp-ThresholdCSI-
hoom Foilural natar	an May Carrat		n1	RS see TS 38.321 [7],
beamFailureInstan	CEIVIAXCOUITI		n1	
h	C T'			clause 5.17
beamFailureDetect	tion I imer		pbfd4	see TS 38.321 [7],
001.00	10 "		001.50 : :	clause 5.17
CSI-RS	Config 1, 4		CSI-RS.1.1	
configuration for		1	FDD	
CSI reporting				
	Config 2, 5		CSI-RS.1.1	
			TDD	
	Config 3, 6		CSI-RS.2.1	
			TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
tracking	3 ., .			
3	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
SSB Index assigne		<u> </u>		
	u as neivi no	m	0,1	
T310 timer		ms	1000	
N310			2	Duning at the land of the
T1		S	0.2	During this time the
1		1	1	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			0		
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					
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 OCNG DMRS		dB					
SNR_SSB of set q <sub>0</sub>	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q <sub>1</sub>	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
$N_{oc}$	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 clause A.3.6.

#### Table A.4.5.5.1.1-4: Void

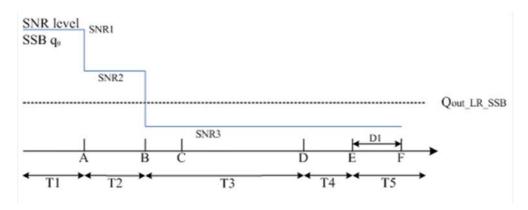


Figure A.4.5.5.1.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

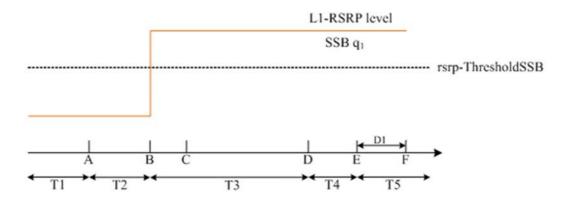


Figure A.4.5.5.1.1-2: L1-RSRP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

## 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.4.5.5.2.1-2 shows the variation of the downlink L1-RSRP 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 5 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 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 i	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 PCe	l		Cell 1	
E-UTRA RF Channe	l Number		1	
Active PSCell	Active PSCell		Cell 2	
RF Channel Number	•		2	
Duplex mode	Config 1,		FDD	
	Config 2, 3, 5, 6		TDD	

BWchannel	Config 1,	MHz	10: NRB,c = 52	
Dvvcnamei	4	IVITZ	10. NKD,C = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3,		40: NRB,c = 106	
DL initial BWP	Config 1,		DLBWP.0.1	
configuration	2, 3, 4, 5,		DEDWI 10.1	
DL dedicated BWP	Config 1,		DLBWP.1.1	
configuration	2, 3, 4, 5, 6			
UL initial BWP	Config 1,		ULBWP.0.1	
configuration	2, 3, 4, 5, 6			
UL dedicated BWP	Config 1,		ULBWP.1.1	
configuration	2, 3, 4, 5, 6			
TDD Configuration	Config 1,		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3,		TDDConf.2.1	
RMSI CORESET Reference Channel	Config 1,		CR.1.1 FDD	
	Config 2,		CR.1.1 TDD	
	Config 3,		CR.2.1 TDD	
Dedicated	Config 1,		CCR.1.1 FDD	
CORESET Reference Channel	4			
	Config 2, 5		CCR.1.1 TDD	
	Config 3,		CCR.2.1 TDD	
SSB Configuration	Config 1,		SSB.3 FR1	
	Config 2, 5		SSB.3 FR1	
	Config 3,		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
3	Config 3,		SMTC.1	
PDSCH/PDCCH subcarrier spacing	Config 1, 2, 4, 5		15 KHz	
	Config 3,		30 KHz	
PRACH	Config 1,		Table	
Configuration	2, 4, 5 Config 3,		A.3.8.2.2-1 Table	
	6		A.3.8.2.2-1	
SSB Index assigned (q <sub>0</sub> )	as BFD RS		0	
SSB Index assigned RS (q <sub>1</sub> )	as CBD		1	
OCNG parameters			OP.1	
CP length			Normal	

				1
Correlation Matrix	and Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
	symbols			
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average			
	SSS RE			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	average			
	SSS RE			
	energy			
	DMRS		REG bundle	
	precoder		size	
	granularity			
	REG bundle		6	
	size			
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
rlmInSyncOutOfSy	ncThreshold		absent	When the field is
, , , , , , ,				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-	Config 1, 2,	dBm/SCS	-98	Threshold used
ThresholdSSB	4, 5	kHz		for Qin LR SSB
powerControlOffse	L Confid 3 b		-95	
	Config 3, 6		-95 db0	Used for deriving
PowerControlOlise			-95 db0	Used for deriving
PowerContiolOlise				rsrp-
	etSS		db0	rsrp- ThresholdCSI-RS
beamFailureInstan	etSS			rsrp- ThresholdCSI-RS see TS 38.321 [7],
beamFailureInstan	etSS ceMaxCount		db0 n1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17
	etSS ceMaxCount		db0	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstan	etSS aceMaxCount tionTimer		db0 n1 pbfd4	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17
beamFailureInstant beamFailureDetect	etSS ceMaxCount		n1 pbfd4 CSI-RS.1.1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstan beamFailureDetec CSI-RS configuration for	etSS aceMaxCount tionTimer		db0 n1 pbfd4	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect	ceMaxCount tionTimer Config 1, 4		n1 pbfd4 CSI-RS.1.1 FDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstan beamFailureDetec CSI-RS configuration for	etSS aceMaxCount tionTimer		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstan beamFailureDetec CSI-RS configuration for	ceMaxCount tionTimer Config 1, 4 Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstan beamFailureDetec CSI-RS configuration for	ceMaxCount tionTimer Config 1, 4		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount tionTimer Config 1, 4 Config 2, 5 Config 3, 6		db0  n1  pbfd4  CSI-RS.1.1 FDD  CSI-RS.1.1 TDD  CSI-RS.2.1 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount tionTimer Config 1, 4 Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount tionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4		db0  n1  pbfd4  CSI-RS.1.1 FDD  CSI-RS.1.1 TDD  CSI-RS.2.1 TDD  TRS.1.1 FDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount tionTimer  Config 1, 4  Config 2, 5  Config 3, 6  Config 1, 4  Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting  CSI-RS for tracking	ceMaxCount tionTimer  Config 1, 4  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting  CSI-RS for tracking	ceMaxCount tionTimer  Config 1, 4  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting  CSI-RS for tracking  SSB Index assigners	ceMaxCount tionTimer  Config 1, 4  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6		db0  n1  pbfd4  CSI-RS.1.1 FDD  CSI-RS.1.1 TDD  CSI-RS.2.1 TDD  TRS.1.1 FDD  TRS.1.1 TDD  TRS.1.2 TDD  0,1	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstant beamFailureDetect CSI-RS configuration for CSI reporting  CSI-RS for tracking	ceMaxCount tionTimer  Config 1, 4  Config 3, 6  Config 1, 4  Config 2, 5  Config 3, 6	ms	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	rsrp- ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],

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 DM	IRS to SSS	dB			0		
EPRE ratio of PDCCH to F	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					
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to F	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q <sub>0</sub>	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q <sub>1</sub>	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
$N_{oc}$	Config 1, 4	dBm/15			-98		
1 oc		KHz					
Config 2, 5			-98				
Config 3, 6			-98				
Propagation condition				TDL-	·C 300ns 1	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

#### Table A.4.5.5.2.1-4: Void

#### Table A.4.5.5.2.1-5: Void

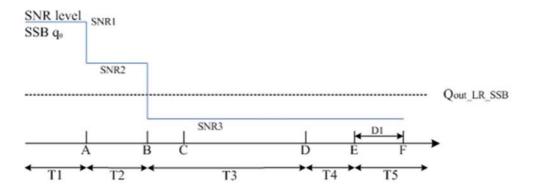


Figure A.4.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in DRX mode

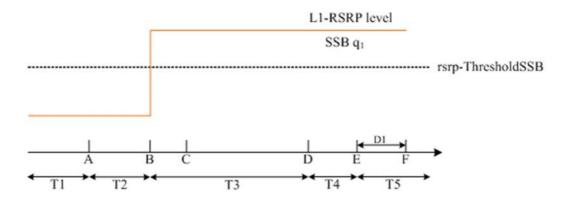


Figure A.4.5.5.2.1-2: L1-RSRP level variation for SSB-based beam failure detection and link recovery testing in DRX mode

## 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 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 = 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.4.5.5.3.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled.

Table A.4.5.5.3.1-1: 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 only required to pass in one of the supported test configurations in FR1					

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parame	Parameter		Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5,		TDD	
	6			
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	

DL initial BWP	Config 1, 2, 3,		DLBWP.0.1	
configuration	4, 5, 6			
DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1	
configuration	4, 5, 6			
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1	
configuration	4, 5, 6			
UL dedicated BWP	Config 1, 2, 3,		ULBWP.1.1	
configuration	4, 5, 6			
TDD Configuration	Config 1, 4		Not Applicable	
9	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Reference Channel	Coming 1, 1		014111111111111111111111111111111111111	7
Transferies Chamie	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	†
Dedicated	Config 1, 4		CCR.1.1 FDD	A.3.1.3
CORESET	Coming 1, 4		CCIX.1.11 DD	A.3.1.3
Reference Channel				
Reference Charmer	Config 2 F		CCD 4.4 TDD	4
	Config 2, 5		CCR.1.1 TDD	-
200 0 11 11	Config 3, 6		CCR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	A.3.10
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4,		SMTC.1	A.3.11
	5			
	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2, 4,		15 KHz	
subcarrier spacing	5			
	Config 3, 6		30 KHz	
PRACH	Config 1, 2, 4,		FR1 PRACH	A.3.8.2
Configuration	5		configuration 4	A.3.6.2
Comiguration	Config 3, 6		FR1 PRACH	A.3.8.2
	Coming 3, 6			A.3.6.2
ani DC Inday anaima	d		configuration 4	
csi-RS-Index assigned			U	
failure detection RS in	i set q <sub>0</sub>		OD 4	1001
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and	l Antenna		2x2 Low	
Configuration	1			
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
	symbols			
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-			
	RS RĔ energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS energy			
	to average			
	CSI-RS RE			
	energy			
ì	Silvigy			1

1		, ,		
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
DDV	size		OFF	
DRX			OFF	
Gap pattern ID	d an and Palata		N.A.	
csi-RS-Index assigned	as candidate		1	
beam detection RS in rlmlnSyncOutOfSync	Throobold		absent	When the field is
Tillingyilcouloisyilc	Tilleshold		absent	absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-ThresholdCSI-	Config 1, 2, 4,	dBm/SCS	-98	Threshold used for
RS	5	kHz	30	Qin LR CSI-RS
	Config 3, 6	IN IZ	-95	_ QIII_LK_CSI-KS
powerControlOffsetS	S		db0	Used for deriving
powercontrolonacto	O		abo	rsrp-ThresholdCSI-
				RS
beamFailureInstance	MaxCount		n1	see TS 38.321 [7],
				clause 5.17
beamFailureDetection	nTimer		pbfd4	see TS 38.321 [7],
			1	clause 5.17
CSI-RS	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
configuration for qo	Config 2, 5		CSI-RS.1.2 TDD	
and q <sub>1</sub>	Config 3, 6		CSI-RS.2.2 TDD	
CSI-RS	Config 1, 4		CSI-RS.1.1 FDD	A.3.14
configuration for	Config 2, 5		CSI-RS.1.1 TDD	
CSI reporting	Config 3, 6	]	CSI-RS.2.1 TDD	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
csi-RS-Index	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
assigned as RLM	Config 2, 5	] [	CSI-RS.1.2 TDD	
RS	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 S	0	
T5			0.08	
D1		S	0.04	
Note 1: UE-specifi	c PDCCH is not tra	ansmitted afte	er ⊺1 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 DMRS to SSS	dB			0		
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					
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q <sub>0</sub>	Config 1, 4	dB	5	-3	-12	-12	-12
·	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1, 4	dB	-10	-10	10	10	10
· ·	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
CSI-RS_RP of set q <sub>1</sub>	Config 1, 4	dBm/	-108	-108	-88	-88	-88
-	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N	Config 1, 4	dBm/15	-98				
$N_{oc}$		KHz					
	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 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: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

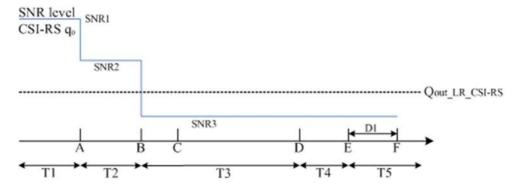


Figure A.4.5.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

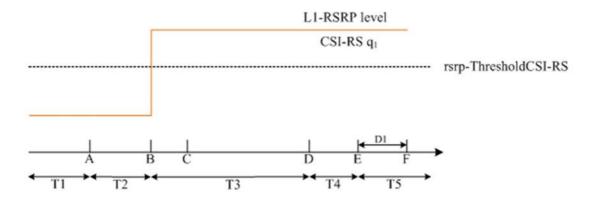


Figure A.4.5.5.3.1-2: L1-RSRP level variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

## 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 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 = 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.4.5.5.4.1-2 shows the variation of the downlink L1-RSRP 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 5 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 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.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Coll   Cell   Cell   RF Channel Number   Config 1, 4   Config 1, 2, 3, configuration   4, 5, 6   Config 1, 4   Config 1, 4, 5, 6   Config 1, 4   Config 1, 2, 3, configuration   4, 5, 6   Config 1, 4   Config 1, 4   Config 2, 5   Config 3, 6   Config 3, 6   Config 3, 6   Config 4, 5, 6   Config 4, 5, 6   Config 4, 5, 6   Config 3, 6   Config 4, 5, 6   Config 5, 5   Config 6, 6   Config 6, 6   Config 7, 4   Config 7, 5   Config 7, 6   Config	Parame	Parameter		Value	Comment
RF Channel Number				Test 1	
Active PSCell   RF Channel Number   2	Active PCell			Cell 1	
RF Channel Number	RF Channel Number			1	
Duplex mode	Active PSCell			Cell 2	
Config 2, 3, 5, 6   TDD	RF Channel Number			2	
BWchannel	Duplex mode	Config 1, 4		FDD	
Config 2, 5		Config 2, 3, 5, 6		TDD	
Config 3, 6	BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
DL initial BWP configuration         Config 1, 2, 3, 4, 5, 6         DL BWP.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 TDDConf.1.1           Config 2, 5         Config 3, 6         TDDConf.2.1           RMSI CORESET Reference         Config 2, 5         CR.1.1 FDD         A.3.1.2           Channel         Config 3, 6         CR.2.1 TDD         A.3.1.3           Dedicated CORESET Reference         Config 1, 4         CCR.1.1 FDD         A.3.1.3           SSB Configuration         Config 2, 5         CCR.1.1 TDD         CCR.2.1 TDD           SSB SB Configuration         Config 1, 4         SSB.3 FR1         A.3.10           SSB.3 FR1         SSB.3 FR1         SSB.3 FR1           Config 3, 6         SSB.4 FR1         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5         SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz				10: NRB,c = 52	
DL initial BWP configuration         Config 1, 2, 3, 4, 5, 6         DL BWP.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 TDDConf.1.1           Config 2, 5         Config 3, 6         TDDConf.2.1           RMSI CORESET Reference         Config 2, 5         CR.1.1 FDD         A.3.1.2           Channel         Config 3, 6         CR.2.1 TDD         A.3.1.3           Dedicated CORESET Reference         Config 1, 4         CCR.1.1 FDD         A.3.1.3           SSB Configuration         Config 2, 5         CCR.1.1 TDD         CCR.2.1 TDD           SSB SB Configuration         Config 1, 4         SSB.3 FR1         A.3.10           SSB.3 FR1         SSB.3 FR1         SSB.3 FR1           Config 3, 6         SSB.4 FR1         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5         SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz		Config 3, 6		40: NRB,c = 106	
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 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           TDDConf.2.1         TDDConf.2.1         CR.1.1 FDD           RMSI CORESET Reference         Config 2, 5 Config 3, 6         CR.1.1 TDD           Channel         Config 2, 5 Config 1, 4 Config 3, 6         CCR.1.1 TDD           Dedicated CORESET Reference         Config 2, 5 Config 3, 6         CCR.1.1 TDD           Channel         Config 2, 5 Config 3, 6 CCR.2.1 TDD         CCR.2.1 TDD           SSB Configuration         Config 1, 4 SSB.3 FR1 SSB	DL initial BWP			DLBWP.0.1	
configuration         4, 5, 6           UL initial BWP configuration         Config 1, 2, 3, 4, 5, 6           UL dedicated BWP configuration         Config 1, 2, 3, 4, 5, 6           TDD Configuration         Config 1, 4 Config 2, 5 TDDConf.1.1           TDD Configuration         Config 3, 6 TDDConf.2.1           RMSI CORESET Reference         Config 1, 4 Config 3, 6 CR.1.1 FDD           Channel         Config 2, 5 Config 3, 6 CR.2.1 TDD           Dedicated CORESET Reference         Config 1, 4 CCR.1.1 FDD           Channel         Config 2, 5 CCR.1.1 TDD           Dedicated Coreser         Config 3, 6 CCR.2.1 TDD           SSB Configuration         Config 1, 4 Config 1, 4 Config 2, 5 COR.2.1 TDD           SSB Configuration         Config 1, 4 SSB.3 FR1 SSB.	configuration	4, 5, 6			
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 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           RMSI CORESET         Config 1, 4 CR.1.1 FDD         A.3.1.2           Reference         Config 2, 5 Config 3, 6 CR.2.1 TDD         CR.1.1 TDD           Channel         Config 3, 6 CR.2.1 TDD         CCR.1.1 FDD           Dedicated CORESET Reference         Config 1, 4 CCR.1.1 TDD         CCR.1.1 TDD           Channel         Config 2, 5 CCR.1.1 TDD         CCR.1.1 TDD           SSB Configuration         Config 1, 4 SSB.3 FR1 SSB.3 FR1 COnfig 3, 6 SSB.3 FR1         A.3.10           SSB Configuration         Config 1, 2, 4, 5 SSB.4 FR1         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5 SMTC.1 SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5 SMTC.1         SMTC.1	DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1	
configuration         4, 5, 6           UL dedicated BWP configuration         Config 1, 2, 3, 4, 5, 6           TDD Configuration         Config 1, 4 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           RMSI CORESET Reference Channel         Config 2, 5 Config 3, 6         CR.1.1 FDD A.3.1.2           Dedicated CORESET Reference Channel         Config 3, 6 CR.2.1 TDD COnfig 3, 6         CCR.1.1 FDD A.3.1.3           Dedicated CORESET Reference Channel         Config 2, 5 CCR.1.1 TDD COnfig 3, 6         CCR.1.1 TDD CONFIGURATION CONFIGURATION SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.4 FR1         A.3.10 SSB.4 FR1 SSB.4 FR1 SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5 SMTC.1 SMTC.1         SMTC.1 A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5 SMTC.1         15 KHz	configuration	4, 5, 6			
configuration         4, 5, 6           UL dedicated BWP configuration         Config 1, 2, 3, 4, 5, 6           TDD Configuration         Config 1, 4 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           RMSI CORESET Reference Channel         Config 2, 5 Config 3, 6         CR.1.1 FDD A.3.1.2           Dedicated CORESET Reference Channel         Config 3, 6 CR.2.1 TDD COnfig 3, 6         CCR.1.1 FDD A.3.1.3           Dedicated CORESET Reference Channel         Config 2, 5 CCR.1.1 TDD COnfig 3, 6         CCR.1.1 TDD CONFIGURATION CONFIGURATION SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.4 FR1         A.3.10 SSB.4 FR1 SSB.4 FR1 SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5 SMTC.1 SMTC.1         SMTC.1 A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5 SMTC.1         15 KHz	UL initial BWP	Config 1, 2, 3,		ULBWP.0.1	
configuration         4, 5, 6           TDD Configuration         Config 1, 4 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           RMSI CORESET Reference Channel         Config 1, 4 Config 2, 5 Config 3, 6         CR.1.1 FDD CR.1.1 TDD CR.2.1 TDD           Dedicated CORESET Reference Channel         Config 1, 4 Config 2, 5 Config 3, 6         CCR.1.1 FDD CR.1.1 FDD         A.3.1.3           SSB Configuration         Config 2, 5 Config 3, 6         CCR.1.1 TDD CR.2.1 TDD         A.3.10           SSB.3 FR1 Config 2, 5 Config 3, 6         SSB.3 FR1 SSB.3 FR1 SSB.3 FR1         A.3.10           SMTC Configuration         Config 1, 2, 4, 5 Config 3, 6         SMTC.1 SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         SMTC.1 SMTC.1         A.3.11		4, 5, 6			
TDD Configuration         Config 1, 4 Config 2, 5 Config 3, 6         Not Applicable TDDConf.1.1           RMSI CORESET Reference Channel         Config 1, 4 CR.1.1 FDD         A.3.1.2           Dedicated CORESET Reference Channel         Config 2, 5 CR.1.1 TDD Config 3, 6 CR.2.1 TDD         CCR.1.1 FDD         A.3.1.3           Dedicated CORESET Reference Channel         Config 2, 5 CCR.1.1 TDD Config 3, 6 CCR.2.1 TDD         CCR.1.1 TDD CCR.2.1 TDD         CCR.2.1 TDD           SSB Configuration         Config 3, 6 CCR.2.1 TDD         SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 Config 3, 6 SSB.4 FR1         CONFIG 3, 6 SSB.4 FR1 SSB.4 FR1 SSB.4 FR1         A.3.11 AS.11           SMTC Configuration         Config 1, 2, 4, 5 SMTC.1 SMTC.1 SMTC.1         A.3.11         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5 SMTC.1 SMTC.1         A.3.11				ULBWP.1.1	
Config 2, 5	configuration	4, 5, 6			
Config 3, 6	TDD Configuration	Config 1, 4			
RMSI CORESET         Config 1, 4         CR.1.1 FDD         A.3.1.2           Reference         Config 2, 5         CR.1.1 TDD         CR.2.1 TDD           Dedicated CORESET         Config 1, 4         CCR.1.1 FDD         A.3.1.3           Reference         Config 2, 5         CCR.1.1 TDD         CCR.2.1 TDD           Channel         Config 3, 6         CCR.2.1 TDD         CCR.2.1 TDD           SSB Configuration         Config 1, 4         SSB.3 FR1         A.3.10           Config 2, 5         SSB.3 FR1         SSB.3 FR1         A.3.10           SMTC Configuration         Config 3, 6         SSB.4 FR1         A.3.11           SMTC.1         SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz					
Reference Channel         Config 2, 5 CR.1.1 TDD           Dedicated CORESET Reference Channel         Config 1, 4 CCR.1.1 FDD           Channel         Config 2, 5 CCR.1.1 TDD           Config 3, 6 CCR.2.1 TDD         CCR.2.1 TDD           SSB Configuration         Config 1, 4 Config 2, 5 SB.3 FR1 Config 2, 5 SB.3 FR1 Config 3, 6 SSB.4 FR1         A.3.10           SMTC Configuration         Config 1, 2, 4, 5 SMTC.1 SMTC.1 A.3.11         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5 SMTC.1 SMTC.1         A.3.11					
Channel         Config 2, 5         CR.1.1 TDD           Dedicated 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.3 FR1           Config 2, 5         SSB.3 FR1         A.3.10           Config 3, 6         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5         SMTC.1           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz	RMSI CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Config 3, 6   CR.2.1 TDD					
Dedicated CORESET Reference         Config 1, 4         CCR.1.1 FDD         A.3.1.3           Channel         Config 2, 5         CCR.1.1 TDD         CCR.2.1 TDD           SSB Configuration         Config 1, 4         SSB.3 FR1         A.3.10           Config 2, 5         SSB.3 FR1         Config 3, 6         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5         SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz	Channel				
Reference         Config 2, 5         CCR.1.1 TDD           Channel         Config 3, 6         CCR.2.1 TDD           SSB Configuration         Config 1, 4         SSB.3 FR1         A.3.10           Config 2, 5         SSB.3 FR1         Config 3, 6         SSB.4 FR1           SMTC Configuration         Config 1, 2, 4, 5         SMTC.1         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz		Config 3, 6		CR.2.1 TDD	
Channel         Config 2, 5         CCR.1.1 TDD           Config 3, 6         CCR.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         A.3.11           PDSCH/PDCCH         Config 1, 2, 4, 5         15 KHz		Config 1, 4		CCR.1.1 FDD	A.3.1.3
Config 3, 6   CCR.2.1 TDD					
SSB Configuration         Config 1, 4	Channel				
Config 2, 5         SSB.3 FR1           Config 3, 6         SSB.4 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					
Config 3, 6         SSB.4 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	SSB Configuration				A.3.10
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					
Config 3, 6   SMTC.1					
PDSCH/PDCCH Config 1, 2, 4, 5 15 KHz	SMTC Configuration				A.3.11
subcarrier spacing Config 3, 6 30 KHz	PDSCH/PDCCH	• • • •			
	subcarrier spacing	Config 3, 6		30 KHz	

PRACH Configuration	Config 1, 2, 4, 5		FR1 PRACH	A.3.8.2
l			configuration 4	70.0.1
	Config 3, 6		FR1 PRACH	A.3.8.2
			configuration 4	
	csi-RS-Index assigned as beam failure detection RS in set q <sub>0</sub>			
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and A	Antenna Configuration		2x2 Low	
Beam failure detection	DCI format		1.0	
transmission parameter			1-0	
tiansinission parametei	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	dB	0	
	average CSI-RS RE energy			
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.7	A.3.3.7
Gap pattern ID			N.A.	
csi-RS-Index assigned detection RS in set q <sub>1</sub>	as candidate beam		1	
rlmInSyncOutOfSyncTh	reshold		absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdCSI-RS		dBm	-98	Threshold used for Qin_LR_CSI-RS
powerControlOffsetSS			db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMa	axCount		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionT	imer		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
for q <sub>0</sub> and q <sub>1</sub>	Config 2, 5	]	CSI-RS.1.2 TDD	
	Config 3, 6		CSI-RS.2.2 TDD	
CSI-RS configuration	Config 1, 4	1	CSI-RS.1.1 FDD	A.3.14
for CSI reporting	Config 2, 5	-	CSI-RS.1.1 TDD	
TDC and for the first	Config 3, 6	-	CSI-RS.2.1 TDD	
TRS configuration	Config 1, 4	-	TRS.1.1 FDD TRS.1.1 TDD	
	Config 2, 5 Config 3, 6	1	TRS.1.1 TDD	
csi-RS-Index	Config 1, 4	<del>                                     </del>	CSI-RS.1.2 FDD	A.3.14
assigned as RLM RS	Config 2, 5	1	CSI-RS.1.2 TDD	71.0.1-1
	Config 3, 6	1	CSI-RS.2.2 TDD	

T310 Timer	ms	1000			
N310		2			
T1	S	1	During this time the the UE shall be fully synchronized to cell 1		
T2	S	8.37			
T3	S	6.44			
T4	S	0			
T5	S	1.97			
D1	S	1.93			
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH 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_CSI-RS of set q <sub>0</sub>	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
CSI-RS_RP of set q <sub>1</sub>	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
$N_{oc}$ Config 1, 4		dBm/15 KHz	-98				
	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 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start.
- Note 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: Void
- 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 REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.4.1-4: Void

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

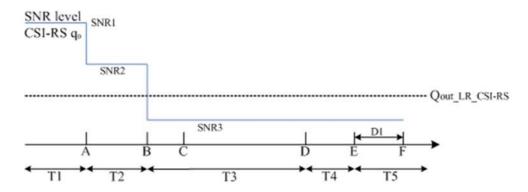


Figure A.4.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

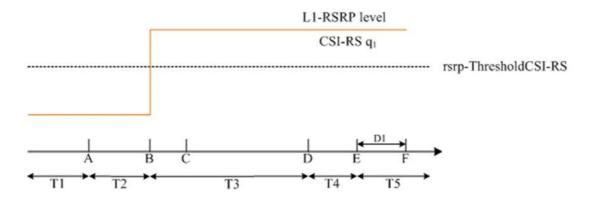


Figure A.4.5.5.4.1-2: L1-RSRP level variation for CSI-RS based beam failure detection and link recovery testing in DRX mode

#### 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 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 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.4.5.6 Active BWP switch

#### A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

# A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

#### A.4.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.4.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one 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 PSCell is specified in Table A.4.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA 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 (E-UTRA 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 on the first DL slot that occurs after the beginning of PSCell's DL slot  $(i+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay})$ .

The starting time of E-UTRA 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 first slot of the 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 on the first DL slot that occurs after the beginning of PSCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k1)$ . The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay})$ .

The starting time of E-UTRA 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/NACK 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 E-UTRA 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 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations.
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.

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 on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.4.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
,	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
3	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW <sub>channel</sub>	Config 1,4		10 MHz: N <sub>RB,c</sub> = 52
	Config 2,5		10 MHz: N <sub>RB,c</sub> = 52
	Config 3,6		40 MHz: N <sub>RB,c</sub> = 106
Active BWP ID	<u> </u>		1, 2
Initial DL BWP	Config 1 4		DLBWP.0.2 Note 4
Configuration	Config 1,4		
	Config 2,5		
	Config 3,6		
Active DL BWP-1 Configuration	Config 1,4		DLBWP.1.1 Note 4
	Config 2,5		
	Config 3,6		
Active DL BWP-2 Configuration	Config 1,4		DLBWP.1.3 Note 4
	Config 2,5		
	Config 3,6		
Initial UL BWP Configuration	Config 1,4		ULBWP.0.2 Note 4
	Config 2,5		
	Config 3,6		
Active UL BWP-1 Configuration Config 1,4			ULBWP.1.1 Note 4
gui ausi.	Config 2,5	_	
	Config 3,6		
Active UL BWP-2	Config 1,4		N/A
Configuration	Config 2,5		ULBWP.1.3 Note 4
	Config 3,6		ULBWP.1.3 Note 4
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.2 FDD
parameters	Config 2,5		CCR.1.2 TDD
	Config 3,6		CCR.2.4 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
Correlation Matrix and A Configuration	ntenna		1x2 Low
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
	<u> </u>	1	

EPRE ratio of PSS to SSS			dB	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ra	EPRE ratio of PDCCH DMRS to SSS			
EPRE ra	tio of PDCCH to	PDCCH DMRS		
EPRE ra	tio of PDSCH DI	MRS to SSS		
EPRE ra	tio of PDSCH to	PDSCH		
EPRE ra	tio of OCNG DM	RS to SSS(Note		
1)				
	tio of OCNG to C	OCNG DMRS		
(Note 1)				
Noc <sup>Note 2</sup>		Config 1,2,4,5	dBm/SCS	-104
		Config 3,6		-101
N <sub>oc</sub> Note 2			dBm/15kH	-104
			Z	
SS-RSR	P Note 3	Config 1,2,4,5	dBm/SCS	-87
•		Config 3,6		-84
Ê <sub>s</sub> /I <sub>ot</sub>			dB	17
Ês/Noc			dB	17
Io <sup>Note3</sup>		Config 1,2,4,5	dBm/	-58.96
		Oomig 1,2,1,0	9.36MHz	
		Config 3,6	dBm/	-52.86
		Comig o,c	38.16MHz	
	tion Condition			AWGN
Note 1:				y allocated and a constant
		· ·	•	red for all OFDM symbols.
Note 2: Interference from other cells and n				•
	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				•
information purposes. They are not				
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBW				
linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.				
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/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k1)$ .

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of 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 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 E-UTRA PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of E-UTRA PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed E-UTRA 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/NACK in the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k1)$ ,  $(j+T_{BWPswitchDelay}+k1)$ , then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

## A.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

#### A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations for LTE PCell and NR PSCell are shown in Table A.4.5.6.1.2.1-1. Supported test configurations for NR SCell are shown in table A.4.5.6.1.2.1-1A. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one 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 PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 and Table A.4.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) and PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA 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 SCell, BWP-1 and BWP-2, in Cell 3 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 PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell'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 on the first DL slot that occurs after the beginning of SCell's DL slot  $(i+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than on the first UL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay}+k_1)$ . The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay})$ .

E-UTRA PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

#### During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after 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 on the first DL slot that occurs after the beginning of SCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than on the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+k_1)$ . The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay})$ .

E-UTRA PCell(Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell and PSCell during BWP switch of SCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations for LTE PCell and NR PSCell

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 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:	Void	
Note 4:		equired to be tested in one with smallest aggregated channel bandwidth from supported ns which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test

Table A.4.5.6.1.2.1-1A: DL BWP switch supported test configurations for NR SCell

Configscell	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode

2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only required to be tested in one of the supported test configurations
Note 2:	A UE which fulfils the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.
Note 3:	The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported
	band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test
	configuration

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		ı	test
NR RF Channel Number		2, 3	Two NR radio channels are used for this
		2, 3	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	uВ	o	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	U	
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.4.5.6.1.2.1-3: NR Cell specific test parameters for NR PSCell 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.2.1
BW <sub>channel</sub>	Config 1,2,3,4,5,6		Note 7
BW <sub>occupied</sub>	Config 1,2,4,5	RB	52 Note 5
	Config 3,6		106 Note 6
Active BWP ID			0
Initial DL BWP	Config 1,2,3,4,5,6		DLBWP.0.2
Configuration	Coming 1,2,3,4,3,0		
Active DL BWP-0	Config 1,2,3,4,5,6		DLBWP.0.2
Configuration	Coming 1,2,3,4,3,0		
Active DL BWP-1	Config 1,2,3,4,5,6		N.A.
Configuration	Outling 1,2,3,4,3,0		
Active DL BWP-2	Config 1 2 3 4 5 6		N.A.
Configuration	Config 1,2,3,4,5,6		

Lance and the F	NA/D	0	Τ	LII DWD o o	
Initial UL E		Config 1,2,3,4,5,6		ULBWP.0.2	
Configurat Active UL		Config 1,2,3,4,5,6		ULBWP.0.2	
Configurat		Corning 1,2,3,4,5,6		ULBVVF.U.Z	
Active UL		Config 1,2,3,4,5,6		N.A.	
Configurat		Johns 1,2,0,1,0,0		14.7 (.	
Active UL		Config 1,2,3,4,5,6		N.A.	
Configurat		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
PDSCH R		Config 1,4		SR.1.1 FDD	
measurem	ent channel	Config 2,5		SR.1.1 TDD	
		Config 3,6		SR.2.1 TDD	
RMSI COF	RESET	Config 1,4		CR.1.1 FDD	
parameter	S	Config 2,5		CR.1.1 TDD	
		Config 3,6		CR.2.1 TDD	
Dedicated	CORESET	Config 1,4		CCR.1.2 FDD	
parameter	S	Config 2,5		CCR.1.2 TDD	
		Config 3,6		CCR.2.4 TDD	
OCNG Pa	tterns	Config 1,2,4,5		OP.1 Note 5	
		Config 3,6		OP.1 Note 6	
SSB Confi	guration	Config 1,2,4,5		SSB.1 FR1	
	•	Config 3,6		SSB.2 FR1	
SMTC Cor	nfiguration			SMTC.1	
TRS Confi	guration	Config 1,4		TRS.1.1 FDD	
		Config 2,5		TRS.1.1 TDD	
		Config 3,6		TRS.1.2 TDD	
	Antenna Configuration			1x2	
	on Condition			AWGN	
	o of PSS to SS		dB	0	
	o of PBCH DM				
	o of PBCH to F				
	o of PDCCH D				
		PDCCH DMRS			
	o of PDSCH D				
	o of PDSCH to				
		IRS to SSS Note 1			
EPRE ratio	o of OCNG to	OCNG DMRS Note 1	ID /45111	10.1	
N <sub>oc</sub> Note 2	Note 2		dBm/15 kHz	-104	
SS-RSRP	Note 3		dBm/15 kHz	-87	
Ês/lot			dB	17	
Ê <sub>s</sub> /N <sub>oc</sub>		Carfin 4 0 4 5	dB	17	
Io <sup>Note3</sup>		Config 1,2,4,5	dBm/9.36MHz	-58.96	
Note 1:	OCNG chall h	Config 3,6 e used such that both	dBm/38.16MHz	-52.86	
INULE 1.		e used such that both ed power spectral den			
Note 2:		om other cells and no			
THOLE Z.		e constant over subca			
AWGN of appropriate power for N <sub>oc</sub> to be fulfilled within BW <sub>occupied</sub> .  Note 3: SS-RSRP and Io levels have been derived from other parameters for					
		rposes. They are not			
Note 4:	-	spectrum, a DL BWP i	·		
				VP.1.1; DLBWP.1.3 is	
		BWP.1.3 defined in cl			
Note 5:					
RBs) from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.					
Note 6: All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz,					
RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.  Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured					
NOIG 1.	BWchannel.	voa nom rabie J.J.Z-	1000.101-1[2] V	vitii ooriiigaica	

Table A.4.5.6.1.2.1-4: NR Cell specific test parameters for NR SCell for DL BWP switch in synchronous EN-DC

Parameter Unit Cell 3			
	tei	Offic	FR1
Frequency Range	Config 1		
Duplex mode	Configscell 1	_	FDD
TDD 6 6	ConfigsCell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
	ConfigsCell 2		TDDConf.1.1
	Configscell 3		TDDConf.2.1
BW <sub>channel</sub>	Configscell 1,2,3		Note 7
BW <sub>occupied</sub>	Config <sub>SCell</sub> 1,2	RB	52 Note 5
	Configscell 3		106 Note 6
Active BWP ID	T		1,2
Initial DL BWP	Configscell 1,2,3		DLBWP.0.2
Configuration	00111g3Ceii 1,2,0		
Active DL BWP-0	Configscell 1,2,3		N.A.
Configuration	Comigscell 1,2,3		
Active DL BWP-1	ConfigsCell 1,2,3		DLBWP.1.3
Configuration	Cornigscell 1,2,3		
Active DL BWP-2	ConfigsCell 1,2,3		DLBWP.1.1
Configuration	Cornigscell 1,2,3		
Initial UL BWP	Config <sub>SCell</sub> 1,2,3		N.A.
Configuration			
Active UL BWP-0	Configscell 1,2,3		N.A.
Configuration			
Active UL BWP-1	Config <sub>SCell</sub> 1,2,3		N.A.
Configuration			
Active UL BWP-2	Config <sub>SCell</sub> 1,2,3		N.A.
Configuration			
PDSCH Reference	Configscell 1		SR.1.1 FDD
measurement channel	ConfigsCell 2		SR.1.1 TDD
	Configscell 3		SR.2.1 TDD
RMSI CORESET	Config <sub>SCell</sub> 1		CR.1.1 FDD
parameters	Configscell 2		CR.1.1 TDD
	Config <sub>SCell</sub> 3		CR.2.1 TDD
Dedicated CORESET	Configscell 1		CCR.1.2 FDD
parameters	Configscell 2		CCR.1.2 TDD
	Configscell 3		CCR.2.4 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 5
	Configscell 3	1	OP.1 Note 6
SSB Configuration	Configscell 1,2		SSB.1 FR1
ool comigaration	Configscell 3	1	SSB.2 FR1
SMTC Configuration	3 5350611 0		SMTC.1
TRS Configuration	ConfigsCell 1		TRS.1.1 FDD
garadon	ConfigsCell 2		TRS.1.1 TDD
	Configscell 3		TRS.1.2 TDD
Antenna Configuration	3 0900011 0		1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SS	SS	dB	0
EPRE ratio of PBCH DM		1	
EPRE ratio of PBCH to F		1	
EPRE ratio of PDCCH D		1	
EPRE ratio of PDCCH to		1	
EPRE ratio of PDSCH D		1	
LENE IAUU UI PUOUN D	101179 10 999		<u> </u>

EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Noc Note 2			dBm/15 kHz	-104
SS-RSR	P Note 3		dBm/15 kHz	-87
Ês/Iot			dB	17
Ês/Noc			dB	17
Io <sup>Note3</sup>	(	Configscell 1,2	dBm/9.36MHz	-58.96
	(	Configscell 3	dBm/38.16MHz	-52.86
Note 1:	OCNG shall be u	used such that bot	th cells are fully allo	cated and a constant
				r all OFDM symbols.
Note 2:	Interference from	n other cells and r	noise sources not sp	ecified in the test is
	assumed to be o	constant over subc	carriers and time and	d shall be modelled as
			oc to be fulfilled with	•
Note 3:	SS-RSRP and lo	o levels have beer	n derived from other	parameters for
	information purposes. They are not settable parameters themselves.			rs themselves.
Note 4:	For unpaired spe	ectrum, a DL BWF	is linked with an U	L BWP. DLBWP.0.2 is
				3WP.1.1; DLBWP.1.3 is
			clause 12 of TS 38.	
Note 5:				upied (i.e. 10 MHz, 52
	RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.			
Note 6: All UL/DL transmission shall be co				
RBs) from F <sub>C,low</sub> , and Io is indeper				
Note 7:		d from Table 5.3.2	2-1 in TS38.101-1[2]	with configured
	BWchannel.			

#### A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot ( $i+T_{BWPswitchDelay}+k_1$ ).

During T3, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k_1)$ .

Where,  $k_1$  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 SCell 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 E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA 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 PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell 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 E-UTRA PCell and PSCell 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/NACK in the first UL slot that occurs after the beginning of DL slot ( $i+T_{BWPswitchDelay}+k_1$ ), ( $j+T_{BWPswitchDelay}+k_1$ ), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

#### A.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

#### A.4.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one 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 PSCell are specified in Table A.4.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA 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 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PSCell from on the first DL slot that occurs after PSCell's DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$  as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot  $i + T_{RRCprocessingDelay} + T_{RRCproce$ 

 $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length} + k1. The UE shall be continuously scheduled on PSCell's BWP-1$ 

starting from the first DL slot occurs after the beginnig of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$ .

 $T_{RRCprocessingDelay}$  and  $T_{BWPswitchDelayRRC}$  are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK 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 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.4.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		I	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	

Table A.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Paran	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.2.1
BW <sub>channel</sub>	Config 1,4		10 MHz: N <sub>RB,c</sub> = 52
	Config 2,5		10 MHz: N <sub>RB,c</sub> = 52
	Config 3,6		40 MHz: N <sub>RB,c</sub> = 106
Active DL BWP ID			1
Initial DL BWP	Config 1,4		DLBWP.0.2
Configuration	Config 2,5		
	Config 3,6		
Initial UL BWP	Config 1,4		ULBWP.0.2
Configuration	Config 2,5		
	Config 3,6		

1-20-1	A - C DI	1	1	DI DIMD 4 0
Initial Condition	Active DL BWP-1 Configurat	Config 1,4		DLBWP.1.3
	ion			
		Config 2,5	]	
		Config 3,6		
	Active UL BWP-1 Configurat	Config 1,4		ULBWP.1.3
		Config 2,5		
		Config 3,6	Ī	
Final	Active DL			DLBWP.1.1
Condition	BWP-1 Configurat ion	Config 1,4		
		Config 2,5	1	
		Config 3,6		
	Active UL	_		ULBWP.1.1
	BWP-1 Configurat	Config 1,4		
		Config 2,5		
		Config 3,6		
PDSCH Re		Config 1,4		SR.1.1 FDD
measureme	ant charmer	Config 2,5	1	SR.1.1 TDD
		Config 3,6	1	SR.2.1 TDD
RMSI COR parameters	-	Config 1,4		CR.1.1 FDD
parameters		Config 2,5	-	CR.1.1 TDD
		Config 3,6	1	CR.2.1 TDD
Dedicated (		Config 1,4		CCR.1.2 FDD
parameters		Config 2,5	-	CCR.1.2 TDD
		Config 3,6	ĺ	CCR.2.4 TDD
OCNG Patt	erns	<u> </u>		OP.1
SSB Config	uration	Config 1,2,4,5		SSB.1 FR1
		Config 3,6		SSB.2 FR1
SMTC Conf	iguration			SMTC.1
TRS Config	uration	Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
A		Config 3,6		TRS.1.2 TDD
Antenna Co				1x2
Propagation			45	AWGN
	f PSS to SSS f PBCH DMRS	to 999	dB	0
	f PBCH to PBC		-	
	f PDCCH DMR		]	
	f PDCCH to PD		_	
	f PDSCH DMR		_	
	f PDSCH to PD		-	
		S to SSS(Note 1) NG DMRS (Note 1)	-	
N <sub>oc</sub> Note 2	I OCING IO OCI	I SIONI) CYINIC ON	dBm/15	-104
INOC ····			kHz	-104
SS-RSRP <sup>N</sup>	ote 3		dBm/15 kHz	-87
Ê <sub>s</sub> /I <sub>ot</sub>			dB	17
<b>-</b> 5/ 101	⊏s/ lot			17

Ê <sub>s</sub> /N <sub>oc</sub>			dB	17		
Io <sup>Note3</sup>		Config 1,2,4,5	dBm/ 9.36MHz	-58.96		
		Config 3,6 dBm/ -52.86 38.16MHz				
Note 1:	OCNG shall be	e used such that bot	th cells are full	y allocated and a constant		
	total transmitte	d power spectral de	ensity is achiev	ed for all OFDM symbols.		
Note 2:	Interference from other cells and noise sources not specified in the test is					
	assumed to be	constant over subo	carriers and tim	ne and shall be modelled		
	as AWGN of a	of appropriate power for N₀c to be fulfilled.				
Note 3:	SS-RSRP and	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	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 on PSCell from the first DL slot occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ , and starts to report valid ACK/NACK for the PSCell

from the first UL slot that occurs after the beginning of DL slot i +  $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length} + k1$ 

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

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%.

### A.4.5.7 PSCell addition and release delay

#### A.4.5.7.1 Addition and Release Delay of known NR PSCell

#### A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of six successive time periods with duration of T1, T2, T3, T4, T5 and T6 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 B1 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 B1. The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell 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 point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

The test system shall observe the periodic reporting of CSI for PSCell during T5. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T5.

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 T5, 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 T6.

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		Value	Comment	
umber		1.2	Two radio channels are used for this test. One	
		1, 2	for E-UTRA cell and second for NR Cell	
Active PCell		Cell1	PCell on RF channel number 1.	
Neighbour cell		Cell2	Neighbour cell on RF channel number 2.	
Active PCell		Cell1	PCell on RF channel number 1.	
Neighbour Cell		Cell2	PSCell released on RF channel number 2.	
Hysteresis	dB	0	Hysteresis for evaluation of event B1.	
Threshold	dBm	-96	Actual RSRP threshold for event B1. Needs to	
RSRP			take absolute accuracy tolerance in clause	
(Config 1,2,4,5)			9.11.1 of TS 36.133 [15] into account plus	
-			margin.	
Threshold	dBm	-93	Actual RSRP threshold for event B1. Needs to	
RSRP			take absolute accuracy tolerance in clause	
(Config 3,6)			9.11.1 of TS 36.133 [15] into account plus	
			margin.	
Time to Trigger	S	0		
		OFF	Continuous monitoring of primary cell	
gap pattern ld		0	Gaps are configured before T2 and released	
			before T3.	
uration on cell2		FR1 PRACH	Captured in A.3.8.2.1	
· ·		configuration	·	
		1		
Cell-individual offset for cells on		0	Individual offset for cells on primary component	
RF channel number 1		U	carrier.	
Cell-individual offset for cells on		0	Individual offset for cells on carrier frequency of	
mber 2	uB	U	cell2.	
	Active PCell Neighbour cell Active PCell Neighbour Cell Hysteresis Threshold RSRP (Config 1,2,4,5)  Threshold RSRP (Config 3,6)  Time to Trigger  gap pattern Id  uration on cell2  offset for cells on mber 1 offset for cells on	Active PCell Neighbour cell Active PCell Neighbour Cell Hysteresis dB Threshold RSRP (Config 1,2,4,5)  Threshold RSRP (Config 3,6)  Time to Trigger S  gap pattern Id  uration on cell2  offset for cells on mber 1 offset for cells on dB	Active PCell Neighbour cell Active PCell Neighbour Cell Neighbour Cell Hysteresis Threshold RSRP (Config 1,2,4,5)  Threshold RSRP (Config 3,6)  Time to Trigger  Gap pattern Id  Offset for cells on mber 1 Offset for cells on of the cell of	

T1	s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2	s	1.5	During this time the UE shall identify neighbour cell (cell2) and report event B1.
Т3	s	3	During this time the test system transmits the RRC messages to release measurement gap and add PSCell.
T4	S	0.5	During this time the UE adds the PSCell.
T5	s	0.5	During this time the UE sends CSI reports for PSCell.
T6	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						
	Offic	Coning	T1	T2	T3	T4	T5	T6	
E-UTRA RF Channel Number		1,2,3,4,5,6	1						
NR RF Channel Number		1,2,3,4,5,6			2				
TDD		1,4			Not App				
configuration		2,5		TDDConf.1.1					
		3,6			TDDCo				
		1,4			10: N <sub>RB</sub>				
BW <sub>channel</sub>	MHz	2,5			10: N <sub>RB</sub>				
		3,6			40: N <sub>RB,0</sub>	= 106			
Initial BWP Configuration		1,2,3			DLBW ULBW				
Dedicated BWP Configuration		1,2,3			DLBW ULBW				
PDSCH		1,4			SR.1.1	FDD			
Reference		2,5			SR.1.1	TDD			
measurement channel		3,6			SR.2.1				
RMSI CORESET		1,4			CR.1.1	FDD			
Reference		2,5			CR.1.1	TDD			
Channel		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			SMT	C.1			
configuration		3,6			SMT	C.1			
TDC		1,4			TRS.1.	I FDD			
TRS -		2,5			TRS.1.				
1		3,6			TRS.1.2				
CSI-RS		1,4			SI-RS.1	.1 FDD			
configuration for		2,5			CSI-RS.1	.1 TDD			
CSI reporting		3,6	CSI-RS.2.1 TDD						
reportConfigType	<u> </u>	1,2,3,4,5,6			perio	dic			

reportQuantity		1,2,3,4,5,6		cri-RI-PMI-CQI		
CSI reporting	-1-1	1,2,4,5		5		
periodicity	slot	3,6		10		
CSI reporting	1	1,2,4,5		2		
offset	slot	3,6		4		
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	dB	3,6 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	1,2,3,4,5,6	N/A	-88		
Note2	dPm/CCC	1,2,4,5	N/A	-88		
$N_{oc}$ Note2	dBm/SCS	3,6	N/A	-85		
$\hat{E}_{_{s}}/I_{_{ m ot}}$		1,2,3,4,5,6	-infinity	0		
$\hat{E}_s/N_{oc}$		1,2,3,4,5,6	-infinity	0		
SS-RSRPNote3	dPm/CCC	1,2,4,5	-infinity	-88		
	dBm/SCS	3,6	-infinity	-85		
Io <sup>Note3</sup>	dBm/9.36MHz	1,2,4,5	N/A	-57		
	dBm/38.1MHz	3,6	N/A	-51		
Propagation condition  Note 1: OCNG s		1,2,3,4,5,6	·			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell no later than 82 ms<sup>Note1</sup> from the start of T4.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T5.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T5

The UE shall stop sending CSI reports for PSCell no later than 20ms from the start of T6.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

$$T_{config\_PSCell} = T_{RRC\_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell\_DU} + 2msWhere$$
:

 $T_{RRC\_delay} = 20 \text{ms}$ 

 $T_{processing} = 20 ms$ 

 $T_{search} = 0$ 

 $T_{\Delta} = 20ms$ 

 $T_{PSCell\_DU} = 1*10+10 = 20ms$ 

### A.4.6 Measurement procedure

### A.4.6.1 Intra-frequency Measurements

#### A.4.6.1.1 EN-DC event triggered reporting tests without gap under non-DRX

#### A.4.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

#### A.4.6.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.1.2-1, A.4.6.1.1.2-2, A.4.6.1.1.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.1.2-1: Supported test configurations

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 1:	The UE is only required to be tested in one of the supported test configurations				
Note 2:	Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2				

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, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1, 4 2, 5 3, 6	SSB.1 FR1 SSB.1 FR1 SSB.2 FR1	
SMTC configuration		1, 4 2, 5 3, 6	SMTC.2 SMTC.1	
A3-Offset	dB	1, 2, 3, 4,	-4.5	
CP length		5, 6 1, 2, 3, 4, 5, 6	Normal	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0	
Time To Trigger	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	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 4	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
	1	2, 5	3 μs	Synchronous cells
		3, 6	3 μs	Synchronous cells
T1	S	1, 2, 3, 4, 5, 6	5	
T2	S	1, 2, 3, 4, 5, 6	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 configuration		Cell 3		
			T1	T2	T1	T2
TDD		1, 4	N/A		N/A	

configuration		2, 5	TDDC	onf.1.1	TDDC	onf 1 1
comigaration		3, 6	_	onf.2.1	TDDC	
PDSCH RMC		1, 4		1 FDD	N.	
configuration		2, 5		1 TDD	1	•
ooringaration		3, 6		1 TDD		
RMSI CORESET		1, 4		1 FDD	N	/A
RMC		2, 5		1 TDD		/A
configuration		3, 6		1 TDD	N.	
Dedicated		1, 4		.1 FDD	N,	= =
CORESET RMC		2, 5		.1 TDD	N.	
configuration		3, 6		.1 TDD		/A
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1	OF	
TRS		1, 2, 3, 4, 3, 0		.1 .1 FDD		/A
configuration		2, 5		.1 TDD		/A
Comiguration		3, 6		.1 TDD	N,	
Initial BWP		1, 2, 3, 4, 5, 6	DLBV		DLBW	
configuration		1, 2, 3, 4, 3, 0	ULBV		ULBW	
Active DL BWP		1, 2, 3, 4, 5, 6	DLBV	/P.1.1	DLBW	/P.1.1
configuration		., _, 0, ., 0, 0				
Active UL BWP		1, 2, 3, 4, 5, 6	ULBV	/P.1.1	ULBWP.1.1	
configuration						
RLM-RS		1, 2, 3, 4, 5, 6	SSB		SSB	
$N_{oc}^{}$ Note 2	dBm/SCS	1, 4		-	-98	
		2, 5			-98	
		3, 6			-95	
$N_{oc}$ Note 2	dBm/15 kHz	1, 4		-	-98	
		2, 5				
		3, 6		ı		
$\mathbf{\hat{E}}_{\!\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\!\scriptscriptstyle \mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6				
$\hat{E}_s/N_{oc}$	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6				
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		AV	VGN	
<del>_</del> .						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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

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 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: Target NR Cell 3						

Table A.4.6.1.2.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment
			Test 1	Test 2	

Active cell		1, 2, 3, 4,	E-UTRAN C	ell 1 and NR	
		5, 6	Ce	ell 2	
Neighbour cell		1, 2, 3, 4,	NR (	Cell 3	Cell to be identified.
_		5, 6			
RF Channel Number		1, 2, 3, 4,	1: C	cell 1	
		5, 6	2: Cell 2	and Cell 3	
SSB configuration		1, 4	SSB.	1 FR1	
		2, 5	SSB.	1 FR1	
		3, 6	SSB.	2 FR1	
SMTC configuration		1, 4	SM <sup>*</sup>	TC.2	
•		2, 5	SM <sup>*</sup>	TC.1	
		3, 6	SM <sup>*</sup>	TC.1	
A3-Offset	dB	1, 2, 3, 4,	-4	l.5	
		5, 6			
CP length		1, 2, 3, 4,	No	rmal	
•		5, 6			
Hysteresis	dB	1, 2, 3, 4,		0	
•		5, 6			
Time To Trigger	S	1, 2, 3, 4,		0	
		5, 6			
Filter coefficient		1, 2, 3, 4,		0	L3 filtering is not used
		5, 6			
DRX		1, 2, 3, 4,	DRX.1	DRX.7	
		5, 6			
Time offset between PCell		1, 2, 3, 4,	3	μs	Synchronous EN-DC
and PSCell		5, 6 1, 4		•	
Time offset between serving		1, 4	3	ms	Asynchronous cells.
and neighbour cells					The timing of Cell 3 is 3ms later
					than the timing of Cell 2.
		2, 5	3 μs		Synchronous cells
		3, 6	3 μs		Synchronous cells
T1	S	1, 2, 3, 4,	5		
		5, 6			
T2	S	1, 2, 3, 4,	5	10	
		5, 6			

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 configuration	Cell 2		Cell 3	
			T1	T2	T1	T2
TDD configuration		1, 4	N,	/A	N/	/A
		2, 5	TDDC	onf.1.1	TDDC	onf.1.1
		3, 6		onf.2.1	TDDC	onf.2.1
PDSCH RMC		1, 4	SR.1.	1 FDD	N/	/A
configuration		2, 5	SR.1.	1 TDD		
		3, 6	SR.2.	1 TDD		
RMSI CORESET		1, 4	CR.1.	1 FDD	N/	/A
RMC		2, 5	CR.1.	1 TDD	N/	/A
configuration		3, 6	CR.2.	1 TDD	N/	/A
Dedicated		1, 4	CCR.1	.1 FDD	N/	/A
CORESET RMC		2, 5	CCR.1	.1 TDD	N/	/A
configuration		3, 6	CCR.2.1 TDD		N/	/A
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1		OF	P.1
TRS		1, 4	TRS.1	.1 FDD	N/	/A
configuration		2, 5	TRS.1	.1 TDD	N/	/A

		3, 6	TRS.1	.2 TDD	N/	/A
Initial BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1	DLBW	/P.0.1
configuration			ULBWP.0.1 ULBWP.0.1			/P.0.1
Active DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.1.1	DLBW	/P.1.1
configuration		, , -, , -, -				
Active UL BWP		1, 2, 3, 4, 5, 6	ULBV	VP.1.1	ULBW	/P.1.1
configuration		, , , , ,				
RLM-RS		1, 2, 3, 4, 5, 6	SS	SB	SS	SB
$N_{oc}$ Note 2	dBm/SCS	1, 2, 3, 4, 5, 6 1, 4			·98	
		2, 5			·98	
					95	
$N_{oc}^{$	dBm/15 kHz	3, 6 1, 4	-98			
		2, 5				
		3, 6	=			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6				
$\hat{E}_s/N_{oc}$	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6				
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.1.2.2 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<sub>DCCH</sub> 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.

Config	g	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				
Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2				

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, 4,	E-UTRAN Cell 1 and NR Cell 2	
		5, 6		
Neighbour cell		1, 2, 3, 4,	NR Cell 3	Cell to be identified.
		5, 6		
RF Channel Number		1, 2, 3, 4,	1: Cell 1	
		5, 6	2: Cell 2 and Cell 3	
Measurement gap type		1, 2, 3, 4,	Per-UE gaps	
		5, 6		
Measurement gap repitition	ms	1, 2, 3, 4,	40	
periodicity		5, 6		
Measurement gap length	ms	1, 2, 3, 4,	6	
		5, 6		
Measurement gap offset	ms	1, 2, 3, 4,	39	
		5, 6		
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	·
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC.2	

		2, 5	SMTC.1	
		3, 6	SMTC.1	
CSI-RS parameters		1, 4	CSI-RS.1.2 FDD resource #0	
-		2, 5	CSI-RS.1.2 TDD resource #0	
		3, 6	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3, 4,	-4.5	
		5, 6		
CP length		1, 2, 3, 4,	Normal	
		5, 6		
Hysteresis	dB	1, 2, 3, 4,	0	
		5, 6		
Time To Trigger	S	1, 2, 3, 4,	0	
		5, 6		
Filter coefficient		1, 2, 3, 4,	0	L3 filtering is not used
		5, 6		-
DRX		1, 2, 3, 4,	N/A	OFF
		5, 6		
Time offset between PCell		1, 2, 3, 4,	3 μs	Synchronous EN-DC
and PSCell		5, 6		
Time offset between serving		1, 4	3 ms	Asynchronous cells.
and neighbour cells				The timing of Cell 3 is 3ms
				later than the timing of Cell 2.
		2, 5	3 μs	Synchronous cells
		3, 6	3 μs	Synchronous cells
T1	S	1, 2, 3, 4,	5	
		5, 6		
T2	S	1, 2, 3, 4,	5	
		5, 6		

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	Се	Cell 2		II 3
		configuration	T1	T2	T1	T2
TDD		1, 4	N	/A	N,	/A
configuration		2, 5	TDDC	onf.1.1	TDDC	onf.1.1
		3, 6	TDDC	onf.2.1	TDDC	onf.2.1
PDSCH RMC		1, 4	SR.1.	1 FDD	N,	/A
configuration		2, 5	SR.1.	1 TDD		
		3, 6	SR.2.	1 TDD		
RMSI CORESET		1, 4	CR.1.	1 FDD	N,	/A
RMC		2, 5	CR.1.	1 TDD	N,	/A
configuration		3, 6	CR.2.	1 TDD	N,	/A
Dedicated		1, 4	CCR.1	.2 FDD	N,	/A
CORESET RMC		2, 5	CCR.1	.2 TDD	N,	/A
configuration		3, 6	CCR.2	CCR.2.1 TDD N		/A
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1	OF	P.1
TRS		1, 4	TRS.1	.1 FDD	N.	/A
configuration		2, 5	TRS.1	.1 TDD	N,	/A
		3, 6	TRS.1	.2 TDD	N,	/A
Initial BWP		1, 2, 3, 4, 5, 6	DLBV	/P.0.1	DLBW	/P.0.1
configuration			ULBV	/P.0.1	ULBW	/P.0.1
Active DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.2		DLBW	/P.1.1
configuration						
Active UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.2 ULBWP.1		/P.1.1	
configuration						
RLM-RS		1, 2, 3, 4, 5, 6	CSI	-RS	L SS	SB

$N_{oc}^{}$ Note 2	dBm/SCS	1, 4	-98			
		2, 5	-98			
		3, 6			-95	
$N_{oc}$ Note 2	dBm/15 kHz	1, 4			-98	
		2, 5				
		3, 6				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6 1, 4				
$\hat{E}_s/N_{oc}$	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6				
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		AV	VGN	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  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<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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

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 mod						
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 more						
Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: Target NR Cell	2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2					

Table A.4.6.1.4.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment
			Test 1	Test 2	
Active cell		1, 2, 3, 4,	E-UTRAN Ce	II 1 and NR Cell	
		5, 6		2	
Neighbour cell		1, 2, 3, 4,	NR	Cell 3	Cell to be identified.
		5, 6			
RF Channel Number		1, 2, 3, 4,		Cell 1	
		5, 6		and Cell 3	
Measurement gap type		1, 2, 3, 4,	Per-l	JE gaps	
		5, 6			
Measurement gap repitition	ms	1, 2, 3, 4,		40	
periodicity		5, 6			
Measurement gap length	ms	1, 2, 3, 4,		6	
		5, 6			
Measurement gap offset	ms	1, 2, 3, 4,		39	
		5, 6			
SSB configuration		1, 4		.1 FR1	
		2, 5	SSB	.1 FR1	
		3, 6	SSB	.2 FR1	
SMTC configuration		1, 4	SM	ITC.2	
_		2, 5	SMTC.1		
		3, 6	SMTC.1		
CSI-RS parameters		1, 4	CSI-RS.1.2 F	DD resource #0	
		2, 5	CSI-RS.1.2 T	DD resource #0	
		3, 6	CSI-RS.2.2 T	DD resource #0	

A3-Offset	dB	1, 2, 3, 4,	_	4.5	
7.00 0.1001		5, 6			
CP length		1, 2, 3, 4,	No	ormal	
		5, 6			
Hysteresis	dB	1, 2, 3, 4,		0	
		5, 6			
Time To Trigger	S	1, 2, 3, 4,		0	
		5, 6			
Filter coefficient		1, 2, 3, 4,		0	L3 filtering is not used
		5, 6			
DRX		1, 2, 3, 4,	DRX.1	DRX.7	
		5, 6			
Time offset between PCell		1, 2, 3, 4,	3	βμs	Synchronous EN-DC
and PSCell		5, 6			
Time offset between serving		1, 4	3	ms	Asynchronous cells.
and neighbour cells					The timing of Cell 3 is 3ms later
					than the timing of Cell 2.
		2, 5	3	βμs	Synchronous cells
		3, 6		βμs	Synchronous cells
T1	S	1, 2, 3, 4,		5	
		5, 6			
T2	S	1, 2, 3, 4,	5	10	
		5, 6			

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 configuration	Cell 2		Ce	ell 3	
			T1	T2	T1	T2	
TDD		1, 4	N	/A	N	I/A	
configuration		2, 5	TDDC	onf.1.1	TDDC	Conf.1.1	
		3, 6		onf.2.1	1	Conf.2.1	
PDSCH RMC		1, 4	SR.1.	1 FDD	N	I/A	
configuration		2, 5	SR.1.	1 TDD			
		3, 6	SR.2.	1 TDD			
RMSI CORESET		1, 4	CR.1.	1 FDD	N	I/A	
RMC		2, 5	CR.1.	1 TDD	N	I/A	
configuration		3, 6	CR.2.	1 TDD	N	I/A	
Dedicated		1, 4	CCR.1	.2 FDD	N/A		
CORESET RMC		2, 5	CCR.1.2 TDD		N	N/A	
configuration		3, 6	CCR.2	.1 TDD	N/A		
OCNG Patterns		1, 2, 3, 4, 5, 6	Ol	P.1	OP.1		
TRS		1, 4	TRS.1	.1 FDD	N/A		
configuration		2, 5	TRS.1	.1 TDD	N/A		
		3, 6	TRS.1	.2 TDD	N/A		
Initial BWP		1, 2, 3, 4, 5, 6	DLBV	√P.0.1	DLB\	NP.0.1	
configuration			ULBV	√P.0.1	ULB\	NP.0.1	
Active DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.1.2	DLB\	WP.1.1	
configuration							
Active UL BWP		1, 2, 3, 4, 5, 6	ULBV	VP.1.2	ULB\	WP.1.1	
configuration		4.0.0.4.5.0	221.22			00	
RLM-RS	-ID /000	1, 2, 3, 4, 5, 6 1, 4	CSI-RS SSE		SB		
$N_{oc}^{ m Note~2}$	dBm/SCS	1, 4	-98				
		2, 5	-98				
		3, 6			-95		

$N_{oc}$ Note 2	dBm/15 KHz	1, 4	-98			
		2, 5				
		3, 6				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6				
$\hat{E}_s/N_{oc}$	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6				
SS-RSRP Note 3	dBm/SCS KHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		AV	VGN	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.1.4.3 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<sub>DCCH</sub> 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

	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				
Note 1:	1: The UE is only required to be tested in one of the supported test configurations					
Note 2:	2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2					

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, 2	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
A3-Offset	dB	1, 2	-4.5	
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	N/A	OFF
Time offset between PCell and PSCell		1, 2	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 2	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	s	1, 2	5	
T2	s	1, 2	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 configuration	Cell 2		Cell 3	
			T1	T2	T1	T2
TDD configuration		1, 2	N/A		N/A	
PDSCH RMC configuration		1, 2	SR.1.	1 FDD	N.	/A
RMSI CORESET RMC configuration		1, 2	CR.1.	1 FDD	N	/A

Dedicated		1, 2	CCR.1	CCR.1.1 FDD N/A		Ά
CORESET RMC						
configuration						
OCNG Patterns		1, 2	OF	P.1	OF	P.1
TRS configuration		1, 2	TRS.1	.1 FDD	N/	Ά
Initial BWP		1, 2	DLBV	/P.0.1	DLBW	/P.0.1
configuration		·	ULBV	/P.0.1	ULBW	/P.0.1
Active DL BWP		1, 2	DLBV	/P.1.1	DLBW	/P.1.1
configuration						
Active UL BWP		1, 2	ULBV	/P.1.1	ULBW	/P.1.1
configuration						
RLM-RS		1, 2	SSB SSB		SB	
$N_{oc}$ Note 2	dBm/SCS	1, 2		-98		
Note 2	dBm/15 kHz	1, 2		•	·98	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46
$\hat{E}_s/N_{oc}$	dB	1, 2	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94	-94	-Infinity	-94
lo	dBm/9.36 MHz	1, 2	-64.60 -62.25 -64.60 -62.25			-62.25
Propagation		1, 2	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.4.6.1.5.3 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<sub>DCCH</sub> 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

	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			
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	ote 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2				

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	Value	Comment
		configur ation		
Active cell		1, 2	E-UTRAN Cell 1 and NR Cell	
			2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 2: Cell 2 and Cell 3	
Measurement 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	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
CSI-RS parameters		1, 2	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1, 2	-4.5	
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	N/A	OFF
Time offset between PCell and PSCell		1, 2	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 2	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1, 2	5	
T2	S	1, 2	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

TDD configuration						II 3		
		configuration	T1	T2	T1 T2			
DD 0 0 1 1 D 1 1 0		1, 2	N/A I		N,	/A		
PDSCH RMC		1, 2	SR.1.1 FDD		N/A			
configuration								
RMSI CORESET		1, 2	CR.1.1 FDD		N/A			
RMC								
configuration								
Dedicated		1, 2	CCR.1	CCR.1.2 FDD		/A		
CORESET RMC								
configuration			ļ					
OCNG Patterns		1, 2	OF		OP.1			
TRS configuration		1, 2		TRS.1.1 FDD		N/A		
Initial 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		4.0	221.22		000			
RLM-RS	ID (000	1, 2	CSI-RS		SSB			
$N_{oc}$ Note 2	dBm/SCS	1, 2	-98					
$N_{oc}$ Note 2	dBm/15 kHz	1, 2	-98					
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46		
$\hat{E}_s/N_{oc}$	dB	1, 2	4	4	-Infinity	4		
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94	-94	-Infinity	-94		
lo	dBm/9.36 MHz	1, 2 1, 2	-64.60 -62.25		-64.60	-62.25		
Propagation Condition		1, 2	AWGN					

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.1.6.3 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<sub>DCCH</sub> 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 dup						
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 I	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: targe	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 carrier frequencies	
Number		1,2,3,4,5,6			is used.	
NR RF Channel		Config	1, 2		Two FR1 NR carrier frequencies is	
Number		1,2,3,4,5,6	·		used.	
Active cell		Config	LTE Cell 1 (F	Cell) and NR	LTE Cell 1 is on E-UTRA RF	
		1,2,3,4,5,6	cell 2 (PScell)		channel number 1.	
					NR Cell 2 is on NR RF channel	
					number 1.	
Neighbour cell		Config	NR (	cell 3	NR cell 3 is on NR RF channel	
		1,2,3,4,5,6			number 2.	

Gap Pattern Id		Config 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	9	9	
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	3	ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3 μs		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	FDD					
		Config	TDD					
		2,3,5,6						
BW <sub>channel</sub>	MHz	Config 1,4	10: N <sub>RB,c</sub> = 52					
		Config 2,5	10: N <sub>RB,c</sub> = 52					
		Config 3,6	40: N <sub>RB,c</sub> = 106					
BWP BW	MHz	Config 1,4	10: N <sub>RB,c</sub> = 52					
		Config 2,5		10: N <sub>RB,c</sub> = 52				
		Config 3,6		40: N <sub>R</sub>	в,с = 106	= 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	DLBV	VP.0.1		NA		
		1,2,3,4,5,6						
Initial UL BWP		Config	ULBV	VP.0.1		NA		
		1,2,3,4,5,6						
Dedicated DL BWP		Config	DLBWP.1.1			NA		
		1,2,3,4,5,6						
Dedicated UL BWP		Config	ULBWP.1.1 NA		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		

	1				1	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	0	P.1		DP.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			
RMSI CORESET Reference		Config 1,4	CR.1.	1 FDD		-
Channel		Config 2,5	CR.1	.1 TDD		
		Config 3,6	CR2.	1 TDD		
Dedicated CORESET Reference Channel		Config 1,4	CCR.1	.1 FDD		
		Config 2,5	CCR.1	.1 TDD		
		Config 3,6		2.1 TDD		
SSB parameters		Config 1,4		1 FR1		3.5 FR1
		Config 2,5		1 FR1		3.5 FR1
		Config 3,6	SSB.	2 FR1	SSE	3.6 FR1
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SN	MTC.5
		Config 2,3,5,6	SM	TC.1	SN	/ITC.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					0	
to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6		0		
EPRE ratio of PDSCH DMRS		1,2,3,4,5,0				
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)	.= /					
$N_{oc}$	dBm/15 kHz			98		-98
Note2 $N_{oc}$	dBm/S	Config	-	98		-98
	CS	1,2,4,5				
NN		Config 3,6		95		-95
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91
	CS	1,2,4,5	04	01	Infinite	00
Ê s /I ot	dB	Config 3,6 Config	-91 4	-91 4	-Infinity -Infinity	-88 7
L s / 1 ot	uD	1,2,3,4,5,6	4	4	-iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	′
$\hat{E}_{s}/N_{oc}$	dB	Config	4	4	-Infinity	7
Io <sup>Note3</sup>	dBm/9.	1,2,3,4,5,6 Config	-64.59	-64.59	-70.05	-62.26
	36MHz	1,2,4,5	-∪∪∂	-04.03	-10.03	-02.20
	dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15
	.16MHz					
Propagation Condition		Config 1,2,3,4,5,6		AV	VGN	
	I	.,-,-,,,,-,				

Note 1:	OCNG shall be 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.4.6.2.1.2 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 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 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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 duples							
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	Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2: target NR	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		Va	lue		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config		•	1		One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6					is used.
NR RF Channel		Config		1,	2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE (	Cell 1 (F	Cell) an	d NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6			PScell)		channel number 1.
				,	•		NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config		NR (	cell 3		NR cell 3 is on NR RF channel
		1,2,3,4,5,6			•		number 2.
Gap Pattern Id		Config	(	0	4	4	As specified in clause 9.1.2-1.
		1,2,3,4,5,6		_			
Measurement gap		Config	3	9	(	9	
offset	ID.	1,2,3,4,5,6					
A3-Offset	dB	Config		-	6		
Hysteresis	dB	1,2,3,4,5,6 Config			)		
nysteresis	uБ	1,2,3,4,5,6		,	J		
CP length		Config		Nor	mal		
Ci lengui		1,2,3,4,5,6		1101	IIIai		
TimeToTrigger	S	Config			)		
lggc.		1,2,3,4,5,6		,			
Filter coefficient		Config		(	)		L3 filtering is not used
		1,2,3,4,5,6					
DRX	ms	Config	DRX	DRX	DRX	DRX	As specified in clause A.3.3
		1,2,3,4,5,6	.1	.7	.1	.7	
Time offset between		Config		3	μs		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6					
Time offset between		Config 1,4		3r	ns		Asynchronous cells.
serving and neighbour							The timing of Cell 3 is 3ms later
cells		0				than the timing of Cell 2.	
		Config 2,3,5,6	3μs				Synchronous cells.
		۷,۵,۵,۵					
T1	s	Config			5		
		1,2,3,4,5,6					
T2	S	Config	1.1	11	1.1	11	
		1,2,3,4,5,6					

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit			12	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2,3,4,5,6	1 2				
Duplex mode		Config 1,4					
Duplex mode		Config			FDD TDD	-	
		2,3,5,6			100		
BWchannel	MHz	Config 1,4		10: N	I <sub>RB,c</sub> = 52		
		Config 2,5		10: N	N <sub>RB,c</sub> = 52		
		Config 3,6		40: N	RB,c = 106		
BWP BW	MHz	Config 1,4			$I_{RB,c} = 52$		
		Config 2,5			$I_{RB,c} = 52$		
TDD configuration		Config 3,6	TDDCc		RB,c = 106	DConf.1.1	
TDD configuration		Config 2,5					
		Config 3,6	TDDCc	onf.2.1	TDE	Conf.2.1	
Initial DL BWP		Config	DLBW	'P.0.1		NA	
		1,2,3,4,5,6					
Initial UL BWP		Config 1,2,3,4,5,6	ULBW	P.0.1		NA	
Dedicated DL BWP		Config	DLBW	/P 1 1		NA	
Bodioatoa BE BVVI		1,2,3,4,5,6	DLDW			1473	
Dedicated UL BWP		Config	ULBW	P.1.1		NA	
		1,2,3,4,5,6					
TRS configuration		Config 1,4	TRS.1.	TRS.1.1 FDD		NA	
C		Config 2,5	TRS.1.	1 TDD		NA	
		Config 3,6	TRS.1.	2 TDD		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OF	P.1		OP.1	
PDSCH Reference		Config 1,4	SR.1.1	FDD			
measurement channel		Config 2,5	SR.1.1				
		Config 3,6	SR2.1				
RMSI CORESET Reference		+ · · · · · · · · · · · · · · · · · · ·					
Channel		Config 1,4	CR.1.1		_	-	
Chambi		Config 2,5	CR.1.1		_		
		Config 3,6 Config 1,4	CR2.1				
Dedicated CORESET			CCR.1.				
Reference Channel		Config 2,5	CCR.1.				
CCD novemeters		Config 3,6	CCR.2.		00	D 5 CD4	
SSB parameters		Config 1,4 Config 2,5	SSB.1 SSB.1			B.5 FR1 B.5 FR1	
		Config 3,6	SSB.2			B.6 FR1	
SMTC configuration defined in A.3.11		Config 1,4	SMT			MTC.5	
-		Config 2,3,5,6	SMTC.1 SMTC		MTC.4		
PDSCH/PDCCH subcarrier	kHz	Config			1		
spacing	NI IZ	1,2,4,5			15		
EPRE ratio of PSS to SSS		Config 3,6			30		
EPRE ratio of PBCH DMRS to SSS		Config 1,2,3,4,5,6	C	)		0	

EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS	<del> </del>							
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 N <sub>oc</sub>	dBm/15 kHz		-98		-98			
Note2 N <sub>oc</sub>	dBm/S	Config	-98		-98			
IV <sub>oc</sub>	cs	1,2,4,5						
		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		
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7		
$\hat{E}_{s}/N_{oc}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7		
Io <sup>Note3</sup>	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				and a consta	nt total transr	nitted power		

- spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as  $\dot{\text{AWGN}}$  of appropriate power for  $_N$  to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- SS-RSRP minimum requirements are specified assuming independent interference and noise at Note 4: 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-UE 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-FR 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.3 Void

A.4.6.2.4 Void

## A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

#### A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description				
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2 LTE FDD, NR 15 k		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:	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2:	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	Value	Comment

		Test configurati	Test 1	Test 2	
		on			
E-UTRA RF Channel		Config	,	1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			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 NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (	PScell)	channel number 1.
					NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config	NR (	cell 3	NR cell 3 is on NR RF channel
		1,2,3,4,5,6		Γ	number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.
Measurement gap		Config	9	9	
offset		1,2,3,4,5,6			
A3-Offset	dB	Config	-	6	
Lhistonoois	dB	1,2,3,4,5,6		)	
Hysteresis	aв	Config 1,2,3,4,5,6	(	J	
CP length		Config	Nor	mal	
Or length		1,2,3,4,5,6	1401	mai	
TimeToTrigger	s	Config	(	)	
		1,2,3,4,5,6			
Filter coefficient		Config	(	)	L3 filtering is not used
		1,2,3,4,5,6			
DRX		Config	0	FF	DRX is not used
		1,2,3,4,5,6			5),50
Time offset between PCell and PSCell		Config	3	μs	Synchronous EN-DC
Time offset between		1,2,3,4,5,6 Config 1,4	3r	ns	Asynchronous cells.
serving and neighbour		Coning 1,4	31	113	The timing of Cell 3 is 3ms later
cells					than the timing of Cell 2.
		Config	3μs		Synchronous cells.
		2,3,5,6			
T1	S	Config		<u> </u>	
		1,2,3,4,5,6			
T2	s	Config	1.1	1	
		1,2,3,4,5,6			

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	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					
		Config	TDD					
		2,3,5,6						
BW <sub>channel</sub>	MHz	Config 1,4		10: N	$I_{RB,c} = 52$			
		Config 2,5		10: N	$I_{RB,c} = 52$			
		Config 3,6	40: N <sub>RB,c</sub> = 106					
BWP BW	MHz	Config 1,4	10: N <sub>RB,c</sub> = 52					
		Config 2,5		10: N	$I_{RB,c} = 52$			

		Config 3,6	40: N	<sub>RB,c</sub> = 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
		Config 2,5 Config 3,6	TRS.1.1 TDD TRS.1.2 TDD	NA NA
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	
		Config 3,6	SR2.1 TDD	
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD	-
Channel		Config 2,5	CR.1.1 TDD	
		Config 3,6	CR2.1 TDD	
Dedicated CORESET Reference Channel		Config 1,4 Config 2,5	CCR.1.1 FDD CCR.1.1 TDD	
Reference Channel		Config 3,6	CCR.2.1 TDD	
SSB parameters		Config 1,4	SSB.1 FR1	SSB.5 FR1
1		Config 2,5	SSB.1 FR1	SSB.5 FR1
		Config 3,6	SSB.2 FR1	SSB.6 FR1
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
EPRE ratio of PSS to SSS		Config 3,6		30
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH				
DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	0	0
EPRE ratio of PDSCH DMRS to SSS		1,2,0,7,0,0		
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	dBm/15		-98	-98
$N_{oc}$	kHz			

Note2 $N_{oc}$	dBm/S CS	Config 1,2,4,5	-98 -95		-98 -95	
		Config 3,6				
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 <sup>Note3</sup>	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 fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

### A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 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 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 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description		
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	3	LTE FDD, NR 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		equired to be tested in one of the supported test configurations		
Note 2:	Note 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 carrier frequencies	
Number		1,2,3,4,5,6					is used.
NR RF Channel		Config		1,	2		Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE (	Cell 1 (F	Cell) an	id NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6		cell 2 (	PScell)		channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config		NR (	cell 3		NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	(	)	4	4	As specified in clause 9.1.2-1.
		1,2,3,4,5,6					
Measurement gap		Config	9	9	(	9	
offset		1,2,3,4,5,6					
A3-Offset	dB	Config	-6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
CP length		Config		Nor	mal		
		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		(	)		L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .7			As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6		3	μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms			Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.	
		Config 2,3,5,6	3µs			Synchronous cells.	
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.3	13.5	1.3	13.5	

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cel	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			-DD	
		Config		7	TDD	
		2,3,5,6				
BW <sub>channel</sub>	MHz	Config 1,4			RB,c = 52	
		Config 2,5			$_{RB,c} = 52$	
		Config 3,6		40: N <sub>F</sub>	RB,c = 106	
BWP BW	MHz	Config 1,4			$_{RB,c} = 52$	
		Config 2,5			RB,c = 52	
		Config 3,6			RB,c = 106	
OCNG Patterns defined in		Config	OF	2.1	(	OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference measurement channel		Config 1,4	SR.1.1			-
measurement channel		Config 2,5	SR.1.1	I TDD		
		Config 3,6	SR.2.1	I TDD		
RMSI CORESET Reference		Config 1,4	CR.1.			-
Channel		Config 2,5	CR.1.			
		Config 3,6	CR.2.			
- " · ! 0055057		Config 1,4	CCR.1.	1 FDD		
Dedicated CORESET Reference Channel		Config 2,5	CCR.1.	1 TDD		
		Config 3,6	CCR.2.	1 TDD		
TDD configuration		Config 2,5		TDDConf.1.1		
		Config 3,6	TDDConf.2.1			
Initial DL BWP		Config	DLBWP.0.1			
		1,2,3,4,5,6				
TRS configuration		Config 1,4	TRS.1	.1 FDD		N/A
_		Config 2,5	TRS.1	.1 TDD		N/A
		Config 3,6	TRS.1	.2 TDD		N/A

Initial UL BWP		Config		ULB	WP.0.1		
		1,2,3,4,5,6					
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1				
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1				
SSB parameters		Config 1,4	SSB.	1 FR1	SSB	.5 FR1	
		Config 2,5	SSB.	1 FR1	SSB	.5 FR1	
		Config 3,6	SSB.2	2 FR1	SSB	.6 FR1	
SMTC configuration defined in A.3.11		Config 1,4	SM	ΓC.2	SM	ITC.5	
		Config 2,3,5,6	SMT	ΓC.1	SM	ITC.4	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15				
EPRE ratio of PSS to SSS		Config 3,6			30		
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS					0		
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	(	)			
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
$N_{_{OC}}$ Note2	dBm/15 kHz		-9	98	-98		
$N_{oc}^{}$ Note2	dBm/S CS	Config 1,2,4,5	-0	98		-98	
N/ A		Config 3,6	-6			-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
^ /	40	Config 3,6	-91 4	-91 4	-Infinity	-88 7	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	·		-Infinity	7	
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
Io <sup>Note3</sup>	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
	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-UE gap, the UE shall send one Event A3 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 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 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 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.7 Void

A.4.6.2.8 Void

A.4.6.3 Void

## A.4.6.4 L1-RSRP measurement for beam reporting

#### A.4.6.4.1 SSB based L1-RSRP measurement when DRX is not used

#### A.4.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.1.1-1.

Table A.4.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config

Description

Co	onfig	Description				
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: T	Note: The UE is only required to be tested in one of the supported test configurations					

### A.4.6.4.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.1.2-1 and Table A.4.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2,5	MHz	10: N <sub>RB,c</sub> = 52
	3,6		40: NRB,c = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Charmer	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
Charlie	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Charlie	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
Illida BVVF Colliguration	1~0		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1

SMTC configuration	1~6		SMTC.1
3	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		QD.	
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~6		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSI	B#0	SSB#1		
Parameter	Config	Onit	T1	T2	T1	T2	
$N_{oc}^{ m Note2}$	1~6	dBm/15kHz	dBm/15kHz -94.65		.65		
N Note2	1,2,4,5	dBm/SSB SCS	-94.65				
¹♥ <sub>oc</sub>	3,6	dbiii/33b 3C3	-91.65				
$\hat{\mathbf{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$	1~6	dB	0	0	-Infinity	3	
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65	
OOD NON	3,6	dbiii/oob ooo	-91.65	-91.65	-Infinity	-88.65	
lo Note3	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93	
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

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.4.6.4.2 SSB based L1-RSRP measurement when DRX is used

#### A.4.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.2.1-1.

Table A.4.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations				

#### A.4.6.4.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.2.2-1 and Table A.4.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6	•	freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1

	1,4		10: N <sub>RB,c</sub> = 52
BWchannel	2,5	MHz	10: N <sub>RB,c</sub> = 52
	3,6		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5	]	SR.1.1 TDD
Charine	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5	<u> </u>	CR.1.1 TDD
	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4	 	CCR.1.1 FDD
Channel	2,5	1	CCR.1.1 TDD CCR.2.1 TDD
	3,6 1,4		SSB.3 FR1
SSB configuration	2,5	}	SSB.3 FR1
COD comiguration	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
			DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
_	3,6		TRS.1.2 TDD
DRX configuration	1~6		DRX.3
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~6	dB	0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG DMRS Note 1	-		
Propagation condition	1~6		AWGN
Note 1: OCNC shall be used such	1 1~0		AWGIN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.2.2-2: SSB specific test parameters

Parameter Config	Unit	SS	SSB#0 SSB#1		B#1	
Faranietei	Coming	Onit	T1	T2	T1	T2

$N_{oc}^{ m Note2}$	1~6	dBm/15kHz -94.65					
<b>√</b> Note2	1,2,4,5	dBm/SSB SCS		-94.65			
$N_{oc}^{ m Note2}$	3,6	UBIII/33B 3C3		-91	.65		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~6	dB	0	0	-Infinity	3	
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65	
SOB RORI	3,6		-91.65	-91.65	-Infinity	-88.65	
lo <sup>Note3</sup>	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  $N_{ac}$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.4.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.4.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

#### A.4.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.3.1-1.

Table A.4.6.4.3.1-1: 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.4.6.4.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.3.2-1 and Table A.4.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.3.2-1: 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 <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2,5	MHz	10: N <sub>RB,c</sub> = 52
	3,6		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Chamilei	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 CODECET Deference	1,4		CCR.1.1 FDD
Dedicated CORESET Reference Channel	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 1.3 FDD
CSI-RS configuration	2,5		CSI-RS 1.3 TDD
-	3,6		CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD
Initial DMD Configuration			DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dedicated PMD configuration	1~6		DLBWP.1.1
Dedicated BWP 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
gcl-Info	1~6		SSB#0 for resource#0
qci-iiiio	1~0		SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	8
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	1		
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~6		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
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
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	1~6	dB	0	3
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65
Note2	3,6	dbiii/33b 303	-91.65	-88.65
lo <sup>Note2</sup>	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

Note 2: Interference from other cells and noise sources not specified in the test is 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.4.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-

RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.4.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

#### A.4.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.4.1-1.

 Config
 Description

 1
 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

 2
 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

 3
 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

 4
 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

 5
 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

 6
 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

 Note:
 The UE is only required to be tested in one of the supported test configurations

Table A.4.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

#### A.4.6.4.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.4.2-1 and Table A.4.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

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 <sub>RB,c</sub> = 52
BWchannel	2,5	MHz	10: N <sub>RB,c</sub> = 52
	3,6		40: N <sub>RB,c</sub> = 106

Table A.4.6.4.4.2-1: General test parameters

PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Chariner	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
Dadicated CODECET Deforance	1,4		CCR.1.1 FDD
Dedicated CORESET Reference Channel	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 1.3 FDD
CSI-RS configuration	2,5		CSI-RS 1.3 TDD
3	3,6	1	CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
3	3,6		TRS.1.2 TDD
LES LEMP O C C			DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dadiated DMD and and	4.0		DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		DRX.3
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
qcl-Info	1~6		SSB#0 for resource#0
•	1~0		SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	8
T1	1~6	s	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG DMRS Note 1	1		
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such that		are fully allo	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
$N_{oc}^{ m Note1}$	1~6	dBm/15kHz	-94.65	
Note1	1,2,4,5	dBm/SSB SCS	-94	.65
TV <sub>oc</sub>	3,6	UDIII/33B 3C3	-91	.65

$\hat{E}_{s}/I_{ot}$	1~6	dB	0	3
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65
Note2	3,6	ubiii/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

Note 2: Interference from other cells and noise sources not specified in the test is 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.4.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.4.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC\_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

## A.4.7.1 SS-RSRP

# A.4.7.1.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.4.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

### A.4.7.1.1.2 Test parameters

In this set of test cases all NR cells are on the same carrier frequency. Supported test configurations are shown in table A.4.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.1.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1 In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only requ	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

_			Te	est 1	Te	st 2	Test 3				
Para	meter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3			
Physical cell ID			489	0	489	0	489	0			
SSB ARFCN			freq1 freq1					freq1			
Duplex mode	Config 1,4		FDD								
Duplex mode	Config 2,3,5,6		TDD								
	Config 1,4				Not App						
TDD configuration	Config 2,5		TDDConf.1.1								
	Config 3,6		TDDConf.2.1								
	Config 1,4				10: N <sub>RB</sub>						
BW <sub>channel</sub>	Config 2,5	MHz			10: N <sub>RB</sub>						
	Config 3,6				40: N <sub>RB</sub> ,						
Downlink initial BWP con					DLBW						
Downlink dedicated BWF					DLBW						
Uplink initial BWP config					ULBW						
Uplink dedicated BWP co	onfiguration				ULBW	P.1.1	_	ı			
	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 App	licable		•				
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD				
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-			
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD				
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD				
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-			
	Config 3,6		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD				
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD				
Control Channel RMC	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-			
	Config 3,6		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD				
SSB configuration	Config 1,4		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1			

		Config 2,5		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1		
		Config 3,6		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	FR1 SSB.2 FR1		
<b>-</b> "	::. 0 !! 0	Config 1,4	ms	-	3	-	3	-	3		
Time offset	with Cell 2	Config 2,3,5,6	μs	-	3	-	3	-	3		
SMTC config	guration	Config 1,4				•					
		Config 2,3,5,6				SMTC.1 OP.1					
OCNG Patte											
PDSCH/PD0	-	Config 1,2,4,5	kHz			15 k 30k					
subcarrier s	of PSS to SSS	Config 3,6				JUK I	ΠZ T				
	of PBCH DMRS	S to SSS									
	of PBCH to PB										
EPRE ratio	of PDCCH DMF	RS to SSS									
	EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0	0	0		
	of PDSCH DMF										
	of PDSCH to Pl										
	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)										
LI IXL IAIO	01 00110 10 00	NR FDD FR1 A,									
		NR_TDD_FR1_A									
		NOTE 6							14		
		NR_FDD_FR1_B							3.5		
	Config	Config NR_TDD_FR1_C			20	-113					
	NR_FDD_FR1_D, 1,2,4,5 NR_TDD_FR1_D -106		106	-8	38	-112.5					
		NR_FDD_FR1_E,	1					-112.0			
		NR_TDD_FR1_E						-1	12		
		NR_FDD_FR1_G						-1	11		
Note2		NR_FDD_FR1_H	dBm/15KhZ					-110.5			
1 voc		NR_FDD_FR1_A,	dbiii/ fortii2								
		NR_TDD_FR1_A						,	1.1		
		NR_FDD_FR1_B							14 3.5		
		NR_TDD_FR1_C							13		
	Config 3,6	NR_FDD_FR1_D,		Not appl	icable <sup>Note 5</sup>	-6	94	-			
		NR_TDD_FR1_D						-112.5			
		NR_FDD_FR1_E,						110			
		NR_TDD_FR1_E NR_FDD_FR1_G	-					-112			
		NR_FDD_FR1_H						-111 -110.5			
									ie as		
] .	Config 1,2,4,5		]	-1	106	-8	38	Noc/	15kHz		
		NR_FDD_FR1_A,						-1	11		
		NR_TDD_FR1_A NOTE									
		NR_FDD_FR1_B	1					_11	0.5		
$N_{oc}^{}$ Note2		NR_TDD_FR1_C	dBm/SCS						10		
- voc	Config 3,6	NR_FDD_FR1_D,		Not appl	icable <sup>Note 5</sup>	-6	91		9.5		
		NR_TDD_FR1_D									
		NR_FDD_FR1_E,						-1	09		
		NR_TDD_FR1_E NR_FDD_FR1_G	-					1	00		
	NR_FDD_FR1_H								08 17.5		
<b>♠</b> / <b>r</b>								-0.01	-4.76		
$\hat{E}_{s}/I_{ot}$			dB	2.46	-5.97	2.46	-5.97				
$\hat{E}_s/N_{oc}$			dB	6	1	6	1	3	0		
		NR_FDD_FR1_A,						-111.00	-114.00		
		NR_TDD_FR1_A									
SS-	Config		dDm/000	100	105	00	0.7	110.50	110.50		
RSRP <sup>Note3</sup>	1,2,4,5	NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SCS	-100	-105	-82	-87	-110.50 -110.00	-113.50 -113.00		
		NR_FDD_FR1_D,	1					-109.50	-112.50		
		NR_TDD_FR1_D									

		NR_FDD_FR1_E,						-109.00	-112.00
		NR_TDD_FR1_E						400.00	444.00
		NR_FDD_FR1_G NR_FDD_FR1_H						-108.00 -107.50	-111.00
		NR_FDD_FR1_A,	-					-107.50	-110.50 -111.00
		NR_FDD_FR1_A, NR_TDD_FR1_A						-106.00	-111.00
		NOTE 6							
		NR_FDD_FR1_B						-107.50	-110.50
		NR_TDD_FR1_C		- Not	Not			-107.00	-110.00
	Config 3,6	NR_FDD_FR1_D,		applicab	applicabl	-85	-90	-106.50	-109.50
		NR_TDD_FR1_D		le <sup>Note 5</sup>	e <sup>Note 5</sup>				
		NR_FDD_FR1_E,						-106.00	-109.00
		NR_TDD_FR1_E	_					405.00	400.00
		NR_FDD_FR1_G	_					-105.00 -104.50	-108.00 -107.50
		NR_FDD_FR1_H NR_FDD_FR1_A,					l		.03
		NR_TDD_FR1_A						-00	.03
		NOTE 6							
		NR_FDD_FR1_B						-79	.53
	0 "	NR_TDD_FR1_C	]					-79	.03
Config	NR_FDD_FR1_D,	dBm/ 9.36MHz	-70	0.09	-52	2.09	-78	.53	
	1,2,4,5	NR_TDD_FR1_D	9.3617172						
		NR_FDD_FR1_E,						-78	.03
		NR_TDD_FR1_E	_						
		NR_FDD_FR1_G							.03
Io <sup>Note3</sup>		NR_FDD_FR1_H							.53
		NR_FDD_FR1_A, NR_TDD_FR1_A						-/3	.94
		NOTE 6							
		NR_FDD_FR1_B						-73	.44
		NR TDD FR1 C	1					-72	.94
	Config 3,6	NR_FDD_FR1_D,	dBm/	Not appl	icableNote 5	-51	.99		.44
	J ,	NR_TDD_FR1_D	38.16MHz						
		NR_FDD_FR1_E,						-71	.94
		NR_TDD_FR1_E							
		NR_FDD_FR1_G							.94
		NR_FDD_FR1_H						-70	.44
	Propagation condition		-			AW	_		
Antenna co		and the second s	!!			1x		.1	
		be used such that both		allocated	and a cons	tant total 1	ransmitte	a power s	pectrai
	,	nieved for all OFDM sy	*	. (	al Carolina de la C				
Note 2:	Interference f	rom other cells and n	oise sources n	ot specified	d in the test	is assum	ed to be d	constant ov	/er

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

### A.4.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

## A.4.7.1.2 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.4.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations in Table A.4.7.1.2.1-1.

Table A.4.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired 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	Confin	l lmit	Test	1	Tes	t 2
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N <sub>RB,0</sub>	= 52	10: $N_{RB,c} = 52$	
BW <sub>channel</sub>	2,5	MHz	10: N <sub>RB,0</sub>	= 52	10: $N_{RB,c} = 52$	
	3,6		40: N <sub>RB,c</sub>	= 106	40: N <sub>RB,0</sub>	= 106
Gap pattern ID			0		0	
	1,4		FDI	)	FD	D
Duplex mode	2,5		TDI	)	TD	D
	3,6		TDI	)	TD	D
	1,4		N/A		N/A	
TDD configuration	2,5		TDDCor	nf.1.1	TDDCo	nf.1.1
	3,6		TDDCor	nf.2.1	TDDCo	nf.2.1
	1,4		SR.1.1 FDD		SR.1.1	
DDCCII Deference	.,.				FDD	
PDSCH Reference measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
measurement channel					SR.2.1	
	3,6		SR.2.1 FDD		FDD	
	1,4		CR.1.1 FDD	_	CR.1.1	_
	1,4		CK.T.T FDD	-	FDD	_
RMSI CORESET Reference	2,5		CR.1.1 TDD	-	CR.1.1	-
Channel					TDD CR.2.1	
	3,6		CR.2.1 FDD	-	FDD	-
	1.4		CCR.1.1 FDD		CCR.1.1	
Dedicated CORESET	1,4		CCK.T.TFDD	-	FDD	-
Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-

			ı	T	T	000.04	ı
		3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-
		1,4		SSB.1	FR1	SSB.1	FR1
SSB config	uration	2,5	ļ	SSB.1		SSB.1	
		3,6		SSB.2		SSB.2	
OCNG Patt	erns	1~6		OP.		OP	
TDC config	uration	1,4	 	TRS.1.1 FDE		TRS.1.1 FD	
TRS config	uration	2,5 3,6		TRS.1.1 TDE		TRS.1.1 TD TRS.1.2 TD	
	_	ĺ		DLBWP.0.1		DLBW	
Initial BWP	Configuration	1~6		ULBWI		ULBW	
Dodinated I	DMD configuration	1~6		DLBWI		DLBW	
Dedicated i	BWP configuration	1~0		ULBWI	P.1.1	ULBW	P.1.1
		1,4	ms	-	3	-	3
Time offset	with Cell 2	2,3,5,6	μs	-	3	-	3
		1,4		SMT	0.2	SMT	C.2
SMTC conf	iguration	2,3,5,6		SMT	C.1	SMT	C.1
EPRF ratio o	of PSS to SSS	_,0,0,0		0	· 	0.711	
	of PBCH DMRS to	1					
SSS		]					
	f PBCH to PBCH						
DMRS FPRF ratio o	of PDCCH DMRS to	_					
SSS							
	f PDCCH to PDCCH	4.0	4D	0	_		
DMRS EPRE ratio o	of PDSCH DMRS to	1~6	dB	0	0	0	0
SSS							
	EPRE ratio of PDSCH to PDSCH						
DMRS EPRE ratio o	of OCNG DMRS to	_					
SSS <sup>Note 1</sup>	I CONC DIVING TO						
EPRE ratio o	f OCNG to OCNG						
DMRS Note 1	NR_FDD_FR1_A,						-115
	NR TDD FR1 A						-113
	NOTE 5,						
	NR_FDD_FR1_B						-114.5
$N_{oc}$ Note2	NR_TDD_FR1_C		dBm/15	-94.6	65	$(N_{oc})$ for	-114
oc oc	NR_FDD_FR1_D,	1~6	kHz			Cell 3	-113.5
	NR_TDD_FR1_D					+8dB)	
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113
	NR_FDD_FR1_G	1					-112
	NR_FDD_FR1_H	<u></u>					-111.5
	NR_FDD_FR1_A,						-115
	NR_TDD_FR1_A						
	,	]					
	NR_FDD_FR1_B	1				M a	-114.5
	NR_TDD_FR1_C	1,2,4,5		-94.6	65	$(N_{oc} \text{ for})$	-114
Note	NR_FDD_FR1_D, NR_TDD_FR1_D					Cell 3	-113.5
$N_{oc}$ Note2 NR_TDD_FR1_D NR_FDD_FR1_E,		1	dBm/SS			+8dB)	-113
	NR_TDD_FR1_E	-	B SCS				
	NR_FDD_FR1_G	4					-112
	NR_FDD_FR1_H NR_FDD_FR1_A,	-	{				-111.5 -112.00
	NR_TDD_FR1_A					M a	-112.00
	NOTE 5,	3,6		-91.6	65	$(N_{oc} \text{ for})$	111 50
	NR_FDD_FR1_B NR_TDD_FR1_C	1				C 3 +8dB)	-111.50 -111.00
		1		I		I	111.00

	NR_FDD_FR1_D,						-110.50	
	NR_TDD_FR1_D							
	NR_FDD_FR1_E, NR_TDD_FR1_E						-110.00	
	NR_FDD_FR1_G						-109.00 -108.50	
	NR_FDD_FR1_H	4.0	ID.	40	40	40		
	$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~6	dB	10	10	13	-3	
SS-	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	1,2,4,5	dBm/SC	-84.€	65	(RSRP for Cell 3 +25dB)	-118.00 -117.50 -117.00 -116.50 -116.00 -115.00 -114.50	
RSRPNote3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3,6	S (RSRI 3,6 -81.65 Cell			(RSRP for Cell 3 +25dB)	-115.00 -114.50 -114.00 -113.50 -113.00 -112.00 -111.50	
Lo Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE6,  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	1,2,4,5	dBm/ 9.36MH z	-56.28		(Io for Channel 3 +19.75dB)	-85.28 -84.78 -84.28 -83.78 -83.28 -82.28 -81.78	
Io <sup>Note3</sup>	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE6,  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3,6	dBm/ 38.16M Hz	-50.19		(Io for Channel 3 +19.75dB)	-79.19  -78.69  -78.19  -77.69  -76.19  -75.69	
1	$\hat{E}_s/N_{oc}$	1~6	dB	10	10	13	-3	
	ation condition	1~6	-			AWGN		
	a configuration	· •		AWGN 1x2		1x2		

Antenna configuration 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.

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:	RSRP and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna port.
Note 5	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification

#### A.4.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.1.1 and Relative requirement in clause 10.1.4.1.2.

#### A.4.7.1.3 Void

### A.4.7.2 SS-RSRQ

# A.4.7.2.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.4.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

#### A.4.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only	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

Parameter		Unit	Te	st 1	Tes	st 2	Test 3		
Falai	neter	Oilit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN		fre	eq1	freq1		freq1			
Dupley made	Config 1,4		FDD						
Duplex mode	Config 2,3,5,6				TE	TDD			
	Config 1,4		Not Applicable						
TDD configuration	Config 2,5		TDDConf.1.1						
	Config 3,6		TDDConf.2.1						
BW <sub>channel</sub>	Config 1,4	MHz	10: N <sub>RB,c</sub> = 52						

		0	1	ı		40.11			
		Config 2,5	-				$_{B,c} = 52$		
		Config 3,6 Initial DL BWP					vP.0.1		
		Dedicated DL				DLDV	VP.U. I		
		BWP				DLBV	VP.1.1		
BWP cor	nfiguration	Initial UL BWP	-			ULBV	VP.0.1		
		Dedicated UL BWP				ULBV	VP.1.1		
DRX Cyc	cle	I.	ms			Not Ap	plicable		
PDSCH	Reference	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
measure	measurement channel	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 Reference	CORESET ce 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	
Control RMC		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	
TRS con	figuration	Config 1,4		TRS.1. 1 FDD	-	TRS.1.1 FDD	-	TRS.1.1 FDD	-
		Config 2,5		TRS.1. 1 TDD		TRS.1.1 TDD		TRS.1.1 TDD	
		Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
OCNG P		t		OP. 1 Not Applicable					
	I-Measureme		me	_	3	Not Ap	3	_	3
Time offs Cell 2	set with	Config 1,4 Config 2,3,5,6	ms µs	-	3	-	3	_	3
SMTC		Config 1,4	μο			SM	TC.2		
configura	ation	Config 2,3,5,6					ГС.1		
		Config 1,2,4,5					1 FR1		
33B (01)	figuration	Config 3,6				SSB.:	2 FR1		
PDSCH/		Config 1,2,4,5	kHz				kHz		
		Config 3,6			T	301	кHz		
	io of PSS to S io of PBCH DN		-						
	io of PBCH to								
EPRE rati	io of PDCCH [	DMRS to SSS							
	EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH		-							
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, NR_TDD_FR1_A NOTE 7				•				14
$N_{oc}$	Config	NR_FDD_FR1_B	dBm/15k		85	-1	01	-11	3.5
Note2	1,2,4,5	NR_FDD_FR1_B	Hz	-	00	-1	υı	-11 -1	
		NR_FDD_FR1_D, NR_TDD_FR1_D	•					-11	
		LIVIN_I DD_FN I_D	1	<u> </u>				1	

	ı	T.:= === == : =	1						
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1 <sup>-</sup>	12
		NR_FDD_FR1_G						-1	11
		NR_FDD_FR1_H						-11	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-1 <sup>-</sup>	14
		NR_FDD_FR1_B						-11	3.5
		NR_TDD_FR1_C							13
	Config 3,6	NR_FDD_FR1_D,		-9	91		-	-11	
	3,0	NR_TDD_FR1_D						-11	2.0
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12
		NR_FDD_FR1_G						-1	11
		NR_FDD_FR1_H						-11	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-114	
		NR_FDD_FR1_B						-113.5	
	Config	NR_TDD_FR1_C						-1 <sup>-</sup>	
	1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D		-8	35	-1	01	-11	2.5
		NR_FDD_FR1_E,							10
		NR_TDD_FR1_E						-1	12
<b>N</b> 7		NR_FDD_FR1_G						-1	
$N_{oc}$		NR_FDD_FR1_H	dBm/SC S					-11	0.5
NF	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-1	11	
		NR_FDD_FR1_B						-11	0.5
	Config	NR_TDD_FR1_C						-110	
	3,6	NR_FDD_FR1_D, NR_TDD_FR1_D		-8	38	-		-109.5	
		NR_FDD_FR1_E,						-109	
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-108 -107.5	
<u> </u>		NR_FDD_FR1_H							
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	-1	.76	-4	.7	-5.46	-5.46
$\hat{E}_s/N_o$	) <i>c</i>	T	dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
	Config	NR_TDD_FR1_C				40	405.5	-117	-117
	1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D		-82	-82	-103.9	-103.9	-116.5	-116.5
SS- RSRP Note3		NR_FDD_FR1_E, NR_TDD_FR1_E	dBm/SC S					-116	-116
140.63		NR_FDD_FR1_G						-115	-115
		NR_FDD_FR1_H						-114.5	-114.5
	NR_FDD_FR1_A, NR_TDD_FR1_A						-115	-115	
	Config	NOTE 7		-85	-85	-   -	-113	-110	
	3,6	NR_FDD_FR1_B		-00			-	-114.5	-114.5
		NR_TDD_FR1_C						-114	-114

	1		ı	1		1	1		1
		NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-113	-113
		NR FDD FR1 G						-112	-112
		NR FDD FR1 H						-111.5	-111.5
		NR_FDD_FR1_A,						-111.5	-111.5
		NR TDD FR1 A	-						
		NOTE 7						ļ	
		NR FDD FR1 B							
		NR_TDD_FR1_C							
SS-RSRQ Note3		NR_FDD_FR1_D,	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_TDD_FR1_D							
		NR_FDD_FR1_E,							
		NR_TDD_FR1_E							
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
		NR_FDD_FR1_A,						ı	
	Config 1,2,4,5	NR_TDD_FR1_A	dBm/ 9.36MHz	-50		-70		-83.5	
		NOTE 7							_
		NR_FDD_FR1_B						-83	
		NR_TDD_FR1_C						-82.5	
		NR_FDD_FR1_D,						-82	
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_FDD_FR1_E,						-81.5	
		NR_FDD_FR1_G						-80.5	
		NR FDD FR1 H						-8	
Io <sup>Note3</sup>		NR FDD FR1 A,							0
		NR TDD FR1 A						-77.4	
		NOTE 7							
		NR_FDD_FR1_B						-76.9	
	0 5	NR_TDD_FR1_C	dBm/						6.4
	Config 3,6	NR_FDD_FR1_D,	38.16M	-50		-		-75.9	
		NR_TDD_FR1_D	Hz					-/3	). <del>9</del>
		NR_FDD_FR1_E,						71	5.4
		NR_TDD_FR1_E						-75.4	
		NR_FDD_FR1_G						-74.4	
		NR_FDD_FR1_H						-73.9	
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  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: Subtest 2 is not used when testing with 30kHz SSB SCS.
- Note 7: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

#### A.4.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

# A.4.7.2.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.4.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter frequency measurement.

#### A.4.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.2.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.4.7.2.2.2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
		Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode	Config 1,4	<u> </u>			FD	D			
Duplex mode	Config 2,3,5,6				TD	D			
	Config 1,4		Not Applicable						
TDD configuration	Config 2,5	TDDConf.1.1							
	Config 3,6				TDDCo	nf.2.1			
	Config 1,4	MHz	10: N <sub>RB,c</sub> = 52						
BW <sub>channel</sub>	Config 2,5		10: N <sub>RB,c</sub> = 52						
	Config 3,6			<i>r</i> -					
	Config 1,4		10: N <sub>RB,c</sub> = 52						
BWP BW	Config 2,5	MHz	10: N <sub>RB,c</sub> = 52						
	Config 3,6				40: N <sub>RB,c</sub>	= 106			
DRX Cycle		ms	Not Applicable						
PDSCH Reference	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
measurement channel	Config 2,5		SR.1.1 TDD	•	SR.1.1 TDD	_		-	

		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 COF Reference		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 Reference	CORESET 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			
TRS config	guration	Config 1,4		TRS.1. 1 FDD	-	TRS.1.1 FDD	-	TRS.1. 1 FDD	-		
		Config 2,5		TRS.1. 1 TDD		TRS.1.1 TDD		TRS.1. 1 TDD			
		Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD			
OCNG Pat	tterns			OCNG pattern 1							
		Config 1,4	ms	-	3	-	3	-	3		
Time offse	t with Cell 2	Config 2,3,5,6	μs	_	3	-	3	_	3		
		Config 1,4	ļ.			SMTC no					
SMTC con	figuration	Config 2,3,5,6	†	SMTC pattern 1							
		Config 1,2,4,5	-		SMTC pattern 1 SSB pattern 1 in FR1						
SSB confi	iguration	Config 3,6	İ			SSB pattern					
PDSCH/PI	ОССН	Config 1,2,4,5				15 k					
subcarrier		Config 3,6	kHz			30 k					
	of PSS to SSS	3 /		00 M 12							
EPRE ratio	of PBCH DMRS										
	of PBCH to PB										
	of PDCCH DMF of PDCCH to P		dB	0	0	0	0	0	0		
	of PDSCH DMF		u.b						O		
EPRE ratio	of PDSCH to P	DSCH									
		EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio	OF OUNCE to OU		1								
	01001000	NG DMRS (Note 1)  NR_FDD_FR1_A  NR_TDD_FR1_A									
	OF OCING TO OC							-116	-116		
	or ocive to oc	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B						-115.5	-115.5		
	Config	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C	dBm/15kHz	-80 18	-80 18	-106	-106				
		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	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5	-115.5		
	Config	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	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5 -115 -114.5	-115.5 -115 -114.5		
$N_{oc}$ Note2	Config	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	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5 -115	-115.5 -115		
$N_{oc}$ Note2	Config	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_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5 -115 -114.5 -114	-115.5 -115 -114.5		
$N_{oc}$ Note2	Config	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_E NR_FDD_FR1_G NR_FDD_FR1_A	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5 -115 -114.5 -114 -113	-115.5 -115 -114.5 -114 -113		
$N_{oc}$	Config	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_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-80.18	-80.18	-106	-106	-115.5 -115 -114.5 -114 -113 -112.5	-115.5 -115 -114.5 -114 -113 -112.5		
$N_{oc}$ Note2	Config	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_E NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_SDL_FR1_B	dBm/15kHz dBm/15kHz	-80.18 -86.27	-80.18 -86.27	-106 -113	-106 -113	-115.5 -115 -114.5 -114 -113 -112.5 -116 -115.5	-115.5 -115 -114.5 -114 -113 -112.5 -116 -115.5		
$N_{ac}^{ m Note2}$	Config 1,2,4,5	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_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B						-115.5 -115 -114.5 -114 -113 -112.5	-115.5 -115 -114.5 -114 -113 -112.5		
$N_{oc}^{ m Note2}$	Config 1,2,4,5	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_E NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_SDL_FR1_B						-115.5 -115 -114.5 -114 -113 -112.5 -116 -115.5	-115.5 -115 -114.5 -114 -113 -112.5 -116 -115.5		

	1	T	1	1	1	1	ı	1	1
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	-114
		NR FDD FR1 G	ł					-113	-114
		NR_FDD_FR1_H						-112.5	-112.5
		NR_FDD_FR1_A			-80.18				
		NR_TDD_FR1_A						110	110
	Config 1,2,4,5	NR_SDL_FR1_A NR_FDD_FR1_B						-116 -115.5	-116 -115.5
		NR_TDD_FR1_C						-115	-115
		NR_FDD_FR1_D		-80.18		-106	-106		
		NR_TDD_FR1_D NR_FDD_FR1_E						-114.5	-114.5
		NR_TDD_FR1_E						-114	-114
		NR_FDD_FR1_G						-113	-113
$N_{oc}$ Note2		NR_FDD_FR1_H	] /					-112.5	-112.5
- · oc		NR_FDD_FR1_A NR_TDD_FR1_A	dBm/SCS						
		NR_SDL_FR1_A						-113	-113
		NR_FDD_FR1_B						-112.5	-112.5
	0	NR_TDD_FR1_C		00.07	00.07	440	440	-112	-112
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-83.27	-83.27	-110	-110	-111.5	-111.5
		NR_FDD_FR1_E	İ						
		NR_TDD_FR1_E	_					-111	-111
		NR_FDD_FR1_G NR_FDD_FR1_H						-110 -109.5	-110 -109.5
Ê s /I ot	Į.	1	dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
$\hat{E}_{s}/N_{oc}$		_	dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
		NR_FDD_FR1_A		-81.93	-81.93	-107.75	-107.75		
	Config 1,2,4,5	NR_TDD_FR1_A NR_SDL_FR1_A						-113	- 117.75
		NR_FDD_FR1_B							-
		1111_1 00_1111_0						-112.5	117.25
		NR_TDD_FR1_C						-112	116.75
		NR_FDD_FR1_D							-
	1,2,1,0	NR_TDD_FR1_D	<b> </b>					-111.5	116.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.75
		NR_FDD_FR1_G	İ						-
								-110	114.75
SS- RSRP <sup>Note3</sup>		NR_FDD_FR1_H	dBm/SCS					-109.5	114.25
KOKP		NR_FDD_FR1_A NR_TDD_FR1_A							_
		NR_SDL_FR1_A		-85.02	-85.02	-111.75	-111.75	-110	114.75
		NR_FDD_FR1_B						-109.5	- 114.25
	Config 3,6	NR_TDD_FR1_C						-109	- 113.75
		NR_FDD_FR1_D	†						-
		NR_TDD_FR1_D						-108.5	113.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.75
		NR_FDD_FR1_G							-
		NR_FDD_FR1_H	†					-107	111.75
		NR FDD FR1 A		-		-40.59		-106.5	111.25
		NR_TDD_FR1_A							
		NR_FDD_FR1_B	7				-40.59		
SS-RSRQ No	ote3	NR_TDD_FR1_C NR_FDD_FR1_D	dB	-14.77	-14.77			-12.56	-14.76
30 1.01.0		NR_TDD_FR1_D	дв	-14.//	-14.77			12.00	
		NR_FDD_FR1_E							
		NR_TDD_FR1_E NR_FDD_FR1_G							
L		' 'W' ' DD ' I KI ' G	l .	1	i .	l .	l	l	l .

		NR_FDD_FR1_H							
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-83.28	-85.83
		NR_FDD_FR1_B						-82.78	-85.33
	Config	NR_TDD_FR1_C	dBm/					-82.28	-84.83
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz	-50	-50	-75.83	-75.83	-81.78	-84.33
		NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	-83.83
		NR_FDD_FR1_G						-80.28	-82.83
Io <sup>Note3</sup>		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	dBm/					-76.19	-78.73
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MHz	-50	-50	-76.73	-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	on condition			AWGN	AWGN	AWGN	AWGN	AWG N	AWG N

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{N_{out}}$  to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Section 3.5.2.

## A.4.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 10.1.9.1.1 and 10.1.9.1.2.

## A.4.7.3 SS-SINR

# A.4.7.3.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

## A.4.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

#### A.4.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.3.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

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.4.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parame	otor	Unit	Tes		Tes	
	eter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	T =		fre		free	<b>q1</b>
Duplex mode	Config 1,4				DD	
	Config 2,3,5,6				DD	
	Config 1,4				plicable	
TDD configuration	Config 2,5				onf.1.1	
Davidial iditial DMD and	Config 3,6				onf.2.1	
Downlink initial BWP cor Downlink dedicated BWI				DLBWP.0.1 DLBWP.1.1		
Uplink initial BWP config					VP.1.1 VP.0.1	
Uplink dedicated BWP configuration					VP.0.1	
DRX Cycle configuration		ms			plicable	
	Config 1,4	1113	TRS.1.1	Νοι πρ	TRS.1.1	
TRS Configuration	Coming 1,4		FDD		FDD	
	Config 2,5		TRS.1.1	_	TRS.1.1	_
			TDD	_	TDD	_
	Config 3,6		TRS.1.2 TDD		TRS.1.2 TDD	
			SR.1.1		SR.1.1	
	Config 1,4		FDD		FDD	
PDSCH Reference	Config 2,5		SR.1.1	_	SR.1.1	_
measurement channel	Corning 2,5		TDD	_	TDD	_
	Config 3,6		SR.2.1		SR2.1	
			TDD CR.1.1		TDD CR.1.1	
	Config 1,4		FDD		FDD	
RMSI CORESET	Config 2,5		CR.1.1		CR.1.1	
Reference Channel	Corning 2,5		TDD	-	TDD	
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD	
	-		CCR.1.		CCR.1.1	
	Config 1,4		1 FDD		FDD	
Dedicated CORESET	Config 2,5		CCR.1.	_	CCR.1.1	_
Reference Channel	Corning 2,5		1 TDD		TDD	_
	Config 3,6		CCR.2.		CCR.2.1	
OCNG Patterns	<b>3</b> ,		1 TDD	0	TDD P.1	
SS-RSSI-Measurement			+		plicable	
	Config 1,4	ms	-	3	-	3
Time offset with Cell 2	Config 2,3,5,6	แร	<del> </del> -	3	_	3
	Config 1,4	μο	+	_	TC.2	
SMTC configuration	Config 2,3,5,6		1		TC.1	
000 (1 1	Config 1,2,4,5		<b>†</b>		1 FR1	
SSB configuration	Config 3,6				2 FR1	
PDSCH/PDCCH	Config 1,2,4,5	1.11-			15	
subcarrier spacing	Config 3,6	kHz			30	
EPRE ratio of PSS to SSS	· · · · · · · · · · · · · · · · · · ·	dB	0	0	0	0

I EDDE	. ( DDOLL DMD(	24.000	I	ı	ı	ı	
	of PBCH DMRS of PBCH to PBC		-				
	of PDCCH DMF						
	of PDCCH to P		1				
	of PDSCH DMF						
	of PDSCH to P						
		S to SSS(Note 1)					
EPRE ratio	of OCNG to OC	CNG DMRS (Note 1)					
		NR_FDD_FR1_A,				-11	16
		NR_TDD_FR1_A					
		NOTE 6					
		NR_FDD_FR1_B				-11	5.5
		NR_TDD_FR1_C	dBm/15kH			-11	15
$N_{oc}$ Note2		NR_FDD_FR1_D,	Z	-6	93	-114	4.5
		NR_TDD_FR1_D					
		NR_FDD_FR1_E,				-11	14
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-11	13
		NR_FDD_FR1_H				-11:	2.5
	Config 1 2 4	5			93	Same as	
	Config 1,2,4	.,		-\		15k	Hz
		NR_FDD_FR1_A,					
		NR_TDD_FR1_A				-11	13
		NOTE 6					
		NR_FDD_FR1_B				-11:	2.5
$N_{oc}^{\rm Note2}$		NR_TDD_FR1_C	dBm/SCS			-11	12
	Config 3,6	NR_FDD_FR1_D,		-6	90	-11	1.5
		NR_TDD_FR1_D				-11	1.5
		NR_FDD_FR1_E,				-11	11
		NR_TDD_FR1_E				-111	
		NR_FDD_FR1_G				-110	
		NR_FDD_FR1_H				-10	9.5
$\hat{E}_{s}/I_{ot}$							
			dB	0	-3.19	-5.46	-5.46
			dB dB	0 4.54	-3.19 2.66	-5.46 -4	-5.46 -4
$\hat{E}_s/N_{oc}$		NR FDD FR1 A	-	-			
		NR_FDD_FR1_A,	-	-		-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A	-	-			
		NR_TDD_FR1_A	-	-		-4 -120	-4 -120
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	-	-		-4 -120 -119.5	-4 -120 -119.5
	Config	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C	-	4.54	2.66	-4 -120 -119.5 -119	-4 -120 -119.5 -119
		NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	-	-		-4 -120 -119.5	-4 -120 -119.5
	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	-	4.54	2.66	-4 -120 -119.5 -119 -118.5	-4 -120 -119.5 -119 -118.5
	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,	-	4.54	2.66	-4 -120 -119.5 -119	-4 -120 -119.5 -119
Ê s/N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E	-	4.54	2.66	-4 -120 -119.5 -119 -118.5	-4 -120 -119.5 -119 -118.5
Ê , /N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117	-4 -120 -119.5 -119 -118.5 -118
Ê s / N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	-	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118	-4 -120 -119.5 -119 -118.5 -118
Ê , /N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5
Ê s / N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A,	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5	-4 -120 -119.5 -119 -118.5 -118
Ê s / N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A, NR_TDD_FR1_A	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117
Ê s / N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C	dB	4.54	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116
Ê s / N oc	Config	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_D, NR_FDD_FR1_D, NR_FDD_FR1_D,	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115
Ê s / N oc	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114
Ê s /N oc  SS- RSRPNot e3	Config 1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G	dB dBm/SCS	-88.46 -85.46	2.66 -90.34 -87.34	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
Ê s / N oc	Config 1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C	dB	-88.46	2.66	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114
Ê s /N oc  SS- RSRPNot e3	Config 1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C	dB dBm/SCS	-88.46 -85.46	2.66 -90.34 -87.34	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5

		NR_TDD_FR1_C			
		NR_FDD_FR1_D,			
		NR_TDD_FR1_D			
		NR_FDD_FR1_E,			
		NR_TDD_FR1_E			
		NR_FDD_FR1_G			
		NR_FDD_FR1_H			
		NR_FDD_FR1_A,			-85.51
		NR_TDD_FR1_A			
		NOTE 6			
		NR_FDD_FR1_B			-85.01
	Config	NR_TDD_FR1_C	dBm/		-84.51
	1,2,4,5	NR_FDD_FR1_D,	9.36MHz	-57.5	-84.01
	1,2,4,0	NR_TDD_FR1_D	3.30IVII 12		
		NR_FDD_FR1_E,			-83.51
		NR_TDD_FR1_E			
		NR_FDD_FR1_G			-82.51
Io <sup>Note3</sup>		NR_FDD_FR1_H			-82.01
.0		NR_FDD_FR1_A,			-79.41
		NR_TDD_FR1_A			
		NOTE 6			
		NR_FDD_FR1_B			-78.91
		NR_TDD_FR1_C	dBm/		-78.41
	Config 3,6	NR_FDD_FR1_D,	38.16MHz	-51.41	-77.91
		NR_TDD_FR1_D	30.10W112		
		NR_FDD_FR1_E,			-77.41
		NR_TDD_FR1_E			
		NR_FDD_FR1_G			-76.41
		NR_FDD_FR1_H			-75.91
	n condition		-	AV	VGN
	onfiguration		-		x2
I Klara 4.	00110 -1111	and the second second of the set the set the	and the same for the co	allegated and another security	. ( ( )

Note 1: OCNG shall be 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.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

# A.4.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 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	y required to be tested in one of the supported test configurations

Table A.4.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parame	otor	Unit	Tes			st 2		st 3
	eter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1,4 Config 2,3,5,6		FDD TDD					
	Config 2,3,5,6					plicable		
TDD configuration	Config 2,5					Conf.1.1		
TOD configuration								
	Config 3,6				IDDC	conf.2.1		
Downlink initial BWP cor	nfiguration				DLB\	VP.0.1		
Downlink dedicated BWI	configuration				DLB\	VP.1.1		
Uplink initial BWP config	uration				ULB\	VP.0.1		
Uplink dedicated BWP c	onfiguration				ULB\	VP.1.1		
DRX Cycle configuration	1	ms	Not Applicable					
Gap pattern ID			0	-	0	-	0	-
TRS Configuration	Config 1,4		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2,5		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1.1 TDD	-
	Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
RMSI CORESET	Config 1,4		CR.1.1 FDD	_	CR.1.1 FDD	_	CR.1.1 FDD	_
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 Reference	CORESET Channel	Config 2,5		CCR.1. 1 TDD	_	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
		Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2. 1 TDD	
OCNG Pat	terns				OP.1				
SS-RSSI-N	Measurement				Not Applicable				
SMTC con	figruation					SM	TC.1		
Time offse	t with Cell 2	Config 1,4	ms	-	3	-	3	-	3
		Config 2,3,5,6	μs	-	3	-	3	-	3
01.170		Config 1,4				SM	TC.2		
SMTC con	figruation	Config 2,3,5,6				SM	TC.1		
		Config 1,2,4,5					1 FR1		
SSB config	guration	Config 3,6	-	SSB.2 FR1					
PDSCH/PI	2CCU	Config 1,2,4,5		15					
subcarrier		Config 3,6	kHz				30		
	of PSS to SSS	Coming 0,0			<u> </u>	<del></del>	50		
EPRE ratio	of PBCH DMRS								
	of PBCH to PBC								
	of PDCCH DMF of PDCCH to P		dB	0	0	0	0	0	0
	of PDSCH DMF		ub.						O
EPRE ratio	of PDSCH to PI	DSCH							
EPRE ratio	of OCNG DMR	S to SSS(Note 1) NG DMRS (Note 1)							
El Ite lado		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			l			-1′	19.5
		NR_FDD_FR1_B							19
$N_{\it oc}^{\rm Note2}$	Config	NR_TDD_FR1_C	dBm/15k		88	-10	8.5	-11	18.5
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	Hz	-00		-100.5		-118	
		NR_FDD_FR1_E						4.	17.5
		NR_TDD_FR1_E							17.5
		NR_FDD_FR1_G							16.5
		NR_FDD_FR1_H							16 s Noc for
	Config 1,2,4	,5			88	-10	8.5		kHz
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							16.5
Notes		NR_FDD_FR1_B						-1	16
$N_{oc}$ Note2	Config 3,6	NR_TDD_FR1_C	dBm/SC S		05	40	5.5		15.5
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	3		85	-10	5.5	-1	15
		NR_FDD_FR1_E NR_TDD_FR1_E						-1 <sup>-</sup>	14.5
		NR_FDD_FR1_G NR_FDD_FR1_H							14.5 13
Ê <sub>s</sub> /I <sub>ot</sub>	1	,	dB	-1	.75	2	0		4.0
s / Ot				<u> </u>	-				-

$\hat{E}_s/N_{oc}$			dB	-1.75	20	-4.0
SS-	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SC	-89.75	-88.5	-123.5  -123 -122.5 -122 -121.5 -120.5 -120
RSRP <sup>Not</sup> e3	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_E NR_FDD_FR1_G NR_FDD_FR1_H	S	-86.75	-85.5	-120.5  -120 -119.5  -119  -118.5  -117.5 -117
SS-SINR <sup>N</sup>	lote3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dB	-1.75	20	-4.0
Io <sup>Note3</sup>	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/ 9.36MHz	-57.83	-60.5	-90.09  -89.59 -89.09 -88.59 -88.09 -87.09 -86.59
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G	dBm/ 38.16MH z	-51.73	-54.41	-84 -83.5 -83 -82.5 -82

		NR_FDD_FR1_H				-80.5	
Propagat	ion condition		-	- AWGN			
Antenna	configuration		-	1x2			
Note 1:		e used such that both eved for all OFDM sy		ly allocated and a co	onstant total transmit	ted power spectral	
Note 2:		om other cells and no d time and shall be m		•			
Note 3:		RSRP, and lo levels le parameters themse		erived from other pa	rameters for informa	tion purposes. They	
Note 4:	SS-SINR, SS- each receiver	RSRP minimum requ antenna port.	irements are	e specified assuming	independent interfe	rence and noise at	
Note 5:	NR operating I	oand groups are as d	efined in Cla	use 3.5.2.			
Note 6:	The test config release of the	guration excludes sup specification.	port for ban	d n51 and it is not re	quired to run this tes	t on band n51 in this	

#### A.4.7.3.2.3 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.4.7.4 L1-RSRP measurement for beam reporting

#### A.4.7.4.1 SSB based L1-RSRP measurement

#### A.4.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.4.7.4.1.1-1.

 Config
 Description

 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

The UE is only required to be tested in one of the supported test configurations in each supported band

Table A.4.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

#### A.4.7.4.1.2 Test parameters

Note:

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.4.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

	Parameter	Config	Unit	Test 1	Test 2
SSB GS	CN	1~6		freq1	freq1
		1,4		FDD	FDD
Duplex m	node	2,5	1	TDD	TDD
'		3,6	İ	TDD	TDD
		1,4		N/A	N/A
TDD Cor	nfiguration	2,5		TDDConf.1.1	TDDConf.1.1
	90.000	3,6		TDDConf.2.1	TDDConf.2.1
		1,4		10: N <sub>RB.c</sub> = 52	10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	ı	2,5	MHz	10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
		3,6		40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 106
		1,4		SR.1.1 FDD	SR.1.1 FDD
PDSCH	Reference	2,5	}	SR.1.1 TDD	SR.1.1 TDD
measure	ment channel	3,6	}	SR.2.1 TDD	SR.2.1 TDD
				CR.1.1 FDD	CR.1.1 FDD
RMSI CC	DRESET Reference	1,4			
Channel		2,5		CR.1.1 TDD	CR.1.1 TDD
		3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicate	d CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
	ce Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
1101010110	o Griannon	3,6		CCR.2.1 TDD	CCR.2.1 TDD
		1,4		SSB.3 FR1	SSB.3 FR1
SSB con	figuration	2,5		SSB.3 FR1	SSB.3 FR1
		3,6		SSB.4 FR1	SSB.4 FR1
OCNG P	atterns	1~6		OP.1	OP.1
		1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS con	figuration	2,5	İ	TRS.1.1 TDD	TRS.1.1 TDD
	J	3,6	İ	TRS.1.2 TDD	TRS.1.2 TDD
		-		DLBWP.0.1	DLBWP.0.1
Initial BW	/P Configuration	1~6		ULBWP.0.1	ULBWP.0.1
	10140	4.0		DLBWP.1.1	DLBWP.1.1
	d BWP configuration	1~6		ULBWP.1.1	ULBWP.1.1
	onfiguration	1~6		SMTC.1	SMTC.1
reportCo	nfigType	1~6		periodic	periodic
reportQu	,	1~6		ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~6		2	2
L1-RSRF	reporting period	1~6		slot80	slot80
EPRE ratio	o of PSS to SSS				
	o of PBCH DMRS to SSS				
	o of PBCH to PBCH DMRS				
	of PDCCH DMRS to SSS				
DMRS	of PDCCH to PDCCH				
	of PDSCH DMRS to SSS	1~6	dB	0	0
EPRE ration	o of PDSCH to PDSCH				
EPRE ratio	o of OCNG DMRS to				
	o of OCNG to OCNG				
	NR_FDD_FR1_A,				
$N_{oc}$	NR_TDD_FR1_A				-117
	NOTE 5	1~6	dBm/15kHz	-94.65	
Note2	NR_FDD_FR1_B	1.50	JDIII/ IJKI IZ	J-7.00	-116.5
	NR TDD FR1 C				-116
<u>I</u>	1417_1DD_11(1_C		<u> </u>		-110

	NR_FDD_FR1_D, NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				110.0
	NR_TDD_FR1_A				-117
	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				-110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
λ7	NR_FDD_FR1_G		dBm/SSB		-114
$N_{oc}$	NR_FDD_FR1_H NR_FDD_FR1_A,		SCS		-113.5
Note2	NR_TDD_FR1_A,				-114
	NOTE 5				117
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,	3,6		-91.65	-112.5
	NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E,				-112
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-111
<u></u>	NR_FDD_FR1_H				-110.5
$\hat{\mathrm{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$		1~6	dB	10	-3
$E_{\rm s}/I_{\rm ot}$	NR_FDD_FR1_A,	1~6	dB	10	-
$E_{\rm s}/I_{\rm ot}$	NR_TDD_FR1_A	1~6	dB	10	-3 -120
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NR_TDD_FR1_A NOTE 5	1~6	dB	10	-120
E <sub>s</sub> /I <sub>ot</sub>	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B	1~6	dB	10	-120 -119.5
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C		dB	-	-120
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	1~6	dB	-84.65	-120 -119.5
E <sub>s</sub> /I <sub>ot</sub>	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D		dB	-	-120 -119.5 -119 -118.5
E <sub>s</sub> /I <sub>ot</sub>	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		dB	-	-120 -119.5 -119
	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D		dB	-	-120 -119.5 -119 -118.5
SSB	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E		dBm/SSB	-	-120 -119.5 -119 -118.5 -118
	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A,			-	-120 -119.5 -119 -118.5 -118 -117 -116.5
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H		dBm/SSB	-	-120 -119.5 -119 -118.5 -118 -117
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B		dBm/SSB	-	-120 -119.5 -119 -118.5 -118 -117 -116.5 -117
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_C	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		dBm/SSB	-	-120 -119.5 -119 -118.5 -118 -117 -116.5 -117
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E	1,2,4,5	dBm/SSB	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114
SSB RSRP Note3	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	1,2,4,5	dBm/SSB SCS	-84.65 -81.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114
SSB RSRP	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_C NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C	1,2,4,5	dBm/SSB SCS	-84.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5 -87.28
SSB RSRP Note3	NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A	1,2,4,5	dBm/SSB SCS	-84.65 -81.65	-120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5

NR_FDD_FR1_D, NR_TDD_FR1_D				-85.78
NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
NR_FDD_FR1_G				-84.28
NR_FDD_FR1_H				-83.78
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-81.19
NR_FDD_FR1_B				-80.69
NR_TDD_FR1_C		dBm/38.16		-80.19
NR_FDD_FR1_D, NR_TDD_FR1_D	3,6	MHz	-50.19	-79.69
NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
NR_FDD_FR1_G				-78.19
NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$	1~6	dB	10	-3
Propagation condition	1~6		AWGN	AWGN
Antenna configuration	1~6		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

# A.4.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

#### A.4.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

# A.4.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.4.7.4.2.1-1.

Table A.4.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode

5	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations in each supported band

# A.4.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.4.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2,5	MHz	10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	3,6		40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 106
DDCCII Deference	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 TDD	SR.2.1 TDD
DMCI CODECET Deference	1,4		CR.1.1 FDD	CR.1.1 FDD
RMSI CORESET Reference 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
Reference Charmer	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 BVVF Configuration	1~0		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
	1,4		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2,5		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3,6		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~6		periodic	periodic

reportQu	antity	1~6		cri-RSRP	cri-RSRP
	of reported RS	1~6		2	2
L1-RSRF	reporting period	1~6		slot80	slot80
	of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		4			
	of PDCCH DMRS to SSS				
	of PDCCH to PDCCH				
DMRS				_	
	of PDSCH DMRS to SSS of PDSCH to PDSCH	1~6	dB	0	0
DMRS	0 01 FD9CH 10 FD9CH				
EPRE ratio	of OCNG DMRS to				
SSS <sup>Note 1</sup>	(00)10 : 00)10				
DMRS Note	of OCNG to OCNG				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
$N_{oc}$	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-94.65	-115.5
	NR_TDD_FR1_D				1 10.0
	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, NR_TDD_FR1_A				-117
	NOTE 5				-11/
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2,4,5		-94.65	
	NR_TDD_FR1_D	, , ,-			-115.5
	NR_FDD_FR1_E,	•			-115
	NR_TDD_FR1_E				-110
	NR_FDD_FR1_G				-114
$N_{oc}$	NR_FDD_FR1_H		dBm/CSI-RS		-113.5
Note2	NR_FDD_FR1_A,		SCS		
	NR_TDD_FR1_A				-114
				112.5	
	NR_FDD_FR1_B NR_TDD_FR1_C				-113.5 -114
	NR_FDD_FR1_D,	3,6		-91.65	
	NR_TDD_FR1_D	5,0		-91.00	-112.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	· <del>-</del>	1~6	dB	10	10
s / Tot	ND EDD ED4 A	1 -0	35	10	10
	NR_FDD_FR1_A, NR_TDD_FR1_A				120
CSI-RS	NR_IDD_FR1_A NOTE 5				-120
RSRP	NR_FDD_FR1_B	1,2,4,5	dBm/CSI-RS	-84.65	-119.5
Note3	NR_TDD_FR1_C	1,2,4,0	SCS	-04.00	-119.5
	NR_FDD_FR1_D,				
	NR_TDD_FR1_D				-118.5
			1	l	1

	T	ı	ı	T	
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-117
	NR_FDD_FR1_H				-116.5
	NR_FDD_FR1_A,				-110.5
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3,6		-81.65	-115.5
	NR_TDD_FR1_D	<b>.</b>			110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E	<u> </u>			-114
	NR_FDD_FR1_G	<u> </u> 			
	NR_FDD_FR1_H NR_FDD_FR1_A,				-113.5
	NR TDD FR1 A				-87.28
	NOTE 5				07.20
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C	†	,2,4,5 dBm/9.36 MHz		-86.28
	NR_FDD_FR1_D,	1,2,4,5		-56.28	-85.78
	NR_TDD_FR1_D				-03.70
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E	<u> </u>			
	NR_FDD_FR1_G	<b>.</b>			-84.28
lo Note3	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A,				04.40
	NR_TDD_FR1_A				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		ID (00.40		-80.19
	NR_FDD_FR1_D,	3,6	dBm/38.16 MHz	-50.19	-79.69
	NR_TDD_FR1_D		IVITZ		-79.09
	NR_FDD_FR1_E,				-79.19
	NR_TDD_FR1_E	ļ			
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$	:	1~6	dB	10	-3
Propagat	ion condition	1~6		AWGN	AWGN
Antenna	configuration	1~6		1x2	1x2
-		1			

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  $N_{oc}$  to be fulfilled.

RSRP and lo levels have been derived from other parameters for information purposes. Note 3: They are not settable parameters themselves.

RSRP minimum requirements are specified assuming independent interference and noise Note 4: at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

### A.4.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS resource reported by UE in L1-RSRP report (CSI-RS#0 or CSI-RS#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.2.

# A.4.7.5 SFTD accuracy

## A.4.7.5.1 SFTD accuracy

# A.4.7.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for EN-DC SFTD measurements.

#### A.4.7.5.1.2 Test Parameters

Supported test configurations are shown in Table A.4.7.5.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is NR FR1 PSCell. The test parameters of cell 1 are given in clause A.3.7.2.1. The test parameters of cell 2 are given in Table A.4.7.5.1.2-2. The SFTD between PCell and PSCell shall be set by the test equipment to one of the time differences in Table A.4.7.5.1.2-3.

Table A.4.7.5.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD	
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.7.5.1.2-2: Test parameters for SFTD accuracy

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2,5	MHz	10: N <sub>RB,c</sub> = 52
	3,6		40: N <sub>RB,c</sub> = 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
SSB configuration	1,4		SSB.1 FR1
33B Configuration	2,5		SSB.1 FR1

		3,6		SSB.2 FR1
SMTC confid	uration	1		
SMTC config		1~6		SMTC.1
DL BWP cor		1~6		DLBWP.1.1
UL BWP cor	ifiguration	1~6		ULBWP.1.1
		1,4		TRS.1.1 FDD
CSI-RS for	tracking	2,5		TRS.1.1 TDD
		3,6		TRS.1.2 TDD
OCNG Patte	rns	1~6		OP.1
EPRE ratio o	of PSS to SSS			
EPRE ratio o	of PBCH DMRS to SSS			
EPRE ratio o	of PBCH to PBCH DMRS			
	of PDCCH DMRS to SSS			
	of PDCCH to PDCCH DMRS	1~6	dB	0
	of PDSCH DMRS to SSS			_
	of PDSCH to PDSCH DMRS			
	of OCNG DMRS to SSS <sup>Note 1</sup>			
	of OCNG to OCNG DMRS Note 1			
EFKE Ialio	I			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	1		
	NR_TDD_FR1_C	1		
3.7	NR_FDD_FR1_D,	1		
$N_{oc}$ Note2	NR_TDD_FR1_D	1~6	dBm/15kHz	-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A <sup>NOTE 5</sup>			404
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR FDD FR1 D,	4045		
	NR_TDD_FR1_D	1,2,4,5		-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
$N_{oc}^{ m Note2}$	NR_FDD_FR1_H		dBm/SSB SCS	
TV <sub>oc</sub>	NR_FDD_FR1_A,			
	NR_TDD_FR1_A <sup>NOTE 5</sup>			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	3,6		-101
	NR_TDD_FR1_D			101
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E	4		
	NR_FDD_FR1_G	_		
	NR_FDD_FR1_H			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~6	dB	-3
$\hat{E}_s/N_{oc}$		1~6	dB	-3
	NR FDD FR1 A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	1		
	NR FDD FR1 D,	1		
SS-RSRP	NR_TDD_FR1_D	1,2,4,5	4Dm/000	-107
Note3	NR_FDD_FR1_E,		dBm/SCS	
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,	3,6		-104
	NR_TDD_FR1_A NOTE 5	5,5		.04

	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			-74.28
	NR_FDD_FR1_D,	1,2,4,5	dBm/9.36 MHz	
	NR_TDD_FR1_D		dB1170.00 W112	
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	3,6	dBm/38.16 MHz	-68.18
	NR_TDD_FR1_D	_		
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagation	n condition	1~6		AWGN
Antenna cor	nfiguration	1~6		1x2
1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.4.7.5.1.2-3: Timing offsets for SFTD accuracy test

Condition	SFN offset between PCell	Frame boundary offset between PCell and
	and PSCell	PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

# A.4.7.5.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and PSCell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.4.7.5.2 Void

A.4.7.5.3 Void

A.4.8 Void

# A.4A NE-DC test with all NR cells in FR1

# A.4A.1 Signaling characteristics

## A.4A.1.1 E-UTRAN PSCell addition

# A.4A.1.1.1 Test purpose and environment

The purpose of this test is to verify that the LTE PSCell addition/release delay and interruption under NE-DC are within the requirements stated in clause 8.8 and clause 8.2.3.2.3 for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4A.1.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1.

The test parameters for NR cell are given in Tables A.4A.1.1.1-2 and cell-specific parameters in A.4A.1.1.1-3 below. The test consists of six successive time periods with duration of T1, T2, T3, T4, T5 and T6 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (NR PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (E-UTRAN 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 B1 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 B1. The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell 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 point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

The test system shall observe the periodic reporting of CSI for PSCell during T5. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T5.

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 T5, 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 T6.

Table A.4A.1.1.1-1: Applicable E-UTRA and NR configurations for NE-DC PSCell addition and Release 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.4A.1.1.1-2: 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
				for NR cell and second for E-UTRAN Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
	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 (Config 1,2,4,5)	dBm	-96	Actual RSRP threshold for event B1.
	Threshold RSRP (Config 3,6)	dBm	-93	Actual RSRP threshold for event B1.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
Measuremer	nt gap pattern Id		0	Gaps are configured before T2 and released before T3.
Cell-individual offset for cells on RF channel number 1 Cell-individual offset for cells on RF channel number 2		dB	0	Individual offset for cells on primary component carrier.
		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 T3		s	1	During this time the UE shall identify neighbour cell (cell2) and report event B1.
		S	3.5	During this time the test system transmits the RRC messages to release measurement gap and add PSCell.
T4	·	S	0.5	During this time the UE adds the PSCell.
T5		S	0.5	During this time the UE sends CSI reports for PSCell.
T6		S	0.5	During this time the UE releases the PSCell.

Table A.4A.1.1.1-3: NR Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test
NR RF Channel Number		1,2,3,4,5,6	1
E-UTRA RF Channel Number		1,2,3,4,5,6	2
TDD		1,4	Not Applicable
configuration		2,5	TDDConf.1.1
		3,6	TDDConf.2.1

BW <sub>channel</sub>	MHz	1,4	10: N <sub>RB,c</sub> = 52
DVV channel	IVII IZ		10: N <sub>RB,c</sub> = 52
		2,5	
Laitial DWD Configuration		3,6	40: N <sub>RB,c</sub> = 106
Initial BWP Configuration		1,2,3	DLBWP.0.1 ULBWP.0.1
Dedicated BWP Configuration		1,2,3	DLBWP.1.1
Bodicatod BVVI Coringaration		1,2,0	ULBWP.1.1
PDSCH Reference		1,4	SR.1.1 FDD
measurement		2,5	SR.1.1 TDD
channel		3,6	SR.2.1 TDD
RMSI CORESET Reference		1,4	CR.1.1 FDD
Channel		2,5	CR.1.1 TDD
		3,6	CR.2.1 TDD
Dedicated CORESET Reference		1,4	CCR.1.1 FDD
Channel		2,5	CCR.1.1 TDD
		3,6	CCR.2.1 TDD
OCNG Patterns		1,2,3,4,5,6	OP.1
SSB configuration		1,2,4,5	SSB.1 FR1
		3,6	SSB.2 FR1
SMTC configuration		1,2,4,5	SMTC.1
- Sivi C Comiguration		3,6	SMTC.1
TRS Configuration		1,4	TRS.1.1 FDD
110 Configuration		2,5	TRS.1.1 TDD
		3,6	TRS.1.2 TDD
CSI-RS configuration for CSI			
reporting		1,4	CSI-RS.1.1 FDD
		2,5	CSI-RS.1.1 TDD
		3,6	CSI-RS.2.1 TDD
reportConfigType		1,2,3,4,5,6	periodic
reportQuantity		1,2,3,4,5,6	cri-RI-PMI-CQI
CSI reporting periodicity	slot	1,2,4,5	5
		3,6	10
CSI reporting offset	slot	1,2,4,5	2
		3,6	4
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	dB	1,2,3,4,5,6	0
DMRS	Q.D	1,2,0,1,0,0	<b>G</b>
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)	ID (4= : : :	100155	60
$N_{_{OC}}$ Note2	dBm/15 kHz	1,2,3,4,5,6	-88
$N_{_{OC}}$ Note2	dBm/SCS	1,2,4,5	-88
oc		3,6	-85
-		1,2,3,4,5,6	0
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1,2,0,7,0,0	

$\hat{E}_s/N_{oc}$		1,2,3,4,5,6	0
SS-RSRP <sup>Note3</sup>	dBm/SCS	1,2,4,5	-88
		3,6	-85
Io <sup>Note3</sup>	dBm/9.36MHz	1,2,4,5	-57
	dBm/38.1MHz	3,6	-51
Propagation condition		1,2,3,4,5,6	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP 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.4A.1.1.1-4: E-UTRAN cell specific test parameters for PSCell Addition and Release tests

Parameter	Unit	E-UTRAN Cell					
		T1	T2	T3	T4	T5	T6
Duplex mode				FDD or	TDD		
TDD special subframe configuration <sup>Note1</sup>		6					
TDD uplink-downlink configuration <sup>Note1</sup>		1					
BW <sub>channel</sub>			5 I	MHz: N <sub>F</sub>	RB,c = 25		
		10 MHz: $N_{RB,c} = 50$					
		20 MHz: $N_{RB,c} = 100$					
PDSCH parameters:			_	MHz: R			
DL Reference Measurement Channel <sup>Note2</sup>			_		R.3 FDD		
			_		R.6 FDD		
			-	MHz: R			
			-		R.0 TDD		
DOTION VDD CON VD HOU					R.3 TDD		
PCFICH/PDCCH/PHICH parameters:			-		11 FDD		
DL Reference Measurement Channel <sup>Note2</sup>			_		R.6 FDD		
			-		.10 FDD		
		5 MHz: R.11 TDD 10 MHz: R.6 TDD					
			_		.10 TDD		
OCNG Patterns <sup>Note2</sup>					.20 FDE		
CONC I ditorns			-	_	.20 1 DE		
			_	_	P.17 FDI		
					P.9 TDD	_	
			_	_	P.1 TDE		
			20	MHz: O	P.7 TDE	)	
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 <sup>Note3</sup>	dB						

OCNG_RB <sup>Note3</sup>	dB		
N <sub>oc</sub> Note4	dBm/15 kHz	N/A	-104
Ê <sub>s</sub> /N <sub>oc</sub>	dB	-infinite	17
Ê <sub>s</sub> /l <sub>ot</sub>	dB	-infinite	17
RSRP Note5	dBm/15 kHz	-infinite	-87
SCH_RP Note5	dBm/15 kHz	-infinite	-87
lo Note5	dBm/Ch BW	N/A	-59.13+10log(N <sub>RB,c</sub> /50)
Propagation Condition			AWGN
Antenna Configuration			1x2

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power

spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N<sub>oc</sub> to be

fulfilled.

Note 5: E<sub>s</sub>/I<sub>ot</sub>, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.4A.1.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 120 ms<sup>Note1</sup> into T4.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T5.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T5

The UE shall stop sending CSI reports for PSCell in at latest 20ms into T6.

Interruption on PCell during PSCell addition and release shall not exceed the values specified for NE-DC in Clause 8.2.3.2.3.

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 8.8 [15]:

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

Where:

 $T_{activation\_time} = 20ms$ 

 $T_{PSCell\_DU} = 0ms$ 

 $T_{E-UTRAN-PSCell\ DU} = 30ms$ 

# A.4A.1.2 Active BWP switch

# A.4A.1.2.1 E-UTRAN PSCell – NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-DRX in synchronous NE-DC

### A.4A.1.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.36.2.6. Supported test configurations are shown in Table A.4A.1.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1), and one E-UTRA PSCell (Cell 2) as given in Table A.4A.1.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.4A.1.2.1.1-3. below, and cell-specific parameters of E-UTRA PSCell are specified in Table A.3.7.2.1-1.

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 PSCell (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 (PSCell) on radio channel 2 (PSCC).
- 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 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 DL slot  $(i+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on PCell's BWP-2 starting from the beginning of the DL slot right after DL slot  $(i+T_{BWPswitchDelay})$ .

The starting time of PSCell(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 *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 PCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell at latest at the beginning of the DL slot right after DL slot  $(j+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on PCell's BWP-1 starting from the beginning of the DL slot right after DL slot  $(j+T_{BWPswitchDelay})$ .

The starting time of PSCell(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 E-UTRA PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of PCell, respectively.

Table A.4A.1.2.1.1-1: 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 on	ly required to be tested in one of the supported test configurations.

Table A.4A.1.2.1.1-2: General test parameters for DL BWP switch in synchronous NE-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
E-UTRA RF Channel		2	One E-UTRA radio channel is used for this
Number		2	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells			Individual offset for cells on PSCC.
on RF channel number 2	dB	0	individual offset for cells off F3CC.
Cell2 timing offset to cell1	μs	3	Synchronous NE-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.4A.1.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous NE-DC

Paramet	er	Unit	Cell 1
Frequency Range			FR1
Duplex mode Config 1,4			FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW <sub>channel</sub>	Config 1,4		10 MHz: N <sub>RB,c</sub> = 52
	Config 2,5		10 MHz: N <sub>RB,c</sub> = 52

Ì	Confin 2.0	1	40 MH=. N 400
Active BWP ID	Config 3,6		40 MHz: N <sub>RB,c</sub> = 106
Initial DL BWP	Config 1,4		1, 2 DLBWP.0.2 Note 4
Configuration	Config 2,5		DEBWI .O.2
Comiguration	Config 3,6		
Active DL BWP-1	Config 1,4		DLBWP.1.1 Note 4
Configuration	Config 2,5		DEBWI ::::
Comiguration	Config 3,6		
Active DL BWP-2	Config 1,4		DLBWP.1.3 Note 4
Configuration	Config 2,5		525
- Comigaration	Config 3,6		
Initial UL BWP	Config 1,4		ULBWP.0.2 Note 4
Configuration	Config 2,5		
3	Config 3,6		
Active UL BWP-1	Config 1,4		ULBWP.1.1 Note 4
Configuration	Config 2,5		
3	Config 3,6		
Active UL BWP-2	Config 1,4		ULBWP.1.3 Note 4
Configuration	Config 2,5		
3	Config 3,6		
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.3 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
Correlation Matrix and A	ntenna		1x2 Low
Configuration			
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
EDDE	Config 3,6		TRS.1.2 TDD
EPRE ratio of PSS to SS			
EPRE ratio of PBCH DM EPRE ratio of PBCH to F			
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to		dB	0
EPRE ratio of PDSCH D		uБ	0
EPRE ratio of PDSCH to			
EPRE ratio of OCNG DM			
1)	INS 10 333(11018		
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1)	CONC DIVINO		
Noc Note 2	Config 1,2,4,5	dBm/SCS	[-104]
	Config 3,6		[-101]
N <sub>oc</sub> Note 2	Jonning 0,0	dBm/15kHz	-104
SS-RSRP Note 3	Config 1,2,4,5	dBm/SCS	[-87]
	Config 3,6	32, 333	[-90]
Ê <sub>s</sub> /I <sub>ot</sub>	<b>J</b> - , -	dB	17
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Io <sup>Note3</sup>	Config 1,2,4,5	dBm/9.36MHz	[-59]
	Config 3,6	dBm/38.16MHz	[-61.9]
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant
	total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled as
	AWGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is
	linked with LILRWP 1.3 defined in clause 12 of TS 38 213 [3]

### A.4A.1.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PCell in the DL slot right after DL slot  $(i+T_{BWPswitchDelay}+k1)$ .

During T3, the UE shall start to send the ACK for PCell 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, the start time of PSCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PSCell interruption of during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.36.2.6.

All of the above test requirements shall be fulfilled in order for the observed PSCell 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.4A.2 Measurement performance

# A.4A.2.1 SFTD accuracy

# A.4A.2.1.1 SFTD accuracy

## A.4A.2.1.1.1 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 10.21.1.1 for NE-DC SFTD measurements.

#### A.4A.2.1.1.2 Test Environment

Supported test configurations are shown in Table A.4A.2.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is NR FR1 PCell and Cell 2 is E-UTRAN target cell. The test parameters of cell 1 are given in clause A.4A.2.1.1.2-2. The test parameters of cell 2 are given in Table A.3.7.2.1. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.4A.2.1.1.2-3.

Table A.4A.2.1.1.2-1: 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 1: The UE is	only required to be tested in one of the supported test configurations
Note 2: A UE whi	ch fulfils the requirements in test case A.4A.1.1 can skip the test cases in A.4.7.5.1

Table A.4A.2.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
Duplex mode	1,4		FDD
	2,5		TDD
	3,6		TDD
TDD Configuration	1,4		N/A
	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
BW <sub>channel</sub>	1,4	MHz	10: N <sub>RB,c</sub> = 52
	2,5		10: $N_{RB,c} = 52$
	3,6		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement channel	1,4		SR.1.1 FDD
	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
RMSI CORESET Reference Channel	1,4		CR.1.1 FDD
	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
RMC CORESET Reference Channel	1,4		CCR.1.1 FDD
	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD

SSB config	uration	1,4		SSB.1 FR1
SSB coming	diation	2,5		SSB.1 FR1
		-		SSB.2 FR1
CMTC	liaration	3,6		
SMTC conf	onfiguration	1~6		SMTC.1
	•	1~6		DLBWP.1.1
	onfiguration	1~6		ULBWP.1.1
OCNG Pat		1~6	ID.	OP.1
	of PSS to SSS	1~6	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			
DMRS	( OON O DATE : OOON oto			
EPRE ratio	of OCNG DMRS to SSS <sup>Note</sup>			
	of OCNG to OCNG DMRS			
Note 1	T.,		.= /.=	
$N_{oc}^{ m Note2}$	NR_FDD_FR1_A,	1~6	dBm/15kHz	-104
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NK_IDD_FKI_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Note?	NR_FDD_FR1_A,	1,2,4,5	dBm/SSB SCS	-104
$N_{oc}^{ m Note2}$	NR_TDD_FR1_A NOTE 5	.,_, .,		
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR FDD FR1 E,			
	NR TDD FR1 E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR FDD FR1 H			
	NR FDD FR1 A,	3,6	1	-101
	NR_TDD_FR1_A NOTE 5	5,5		
	NR FDD FR1 B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR FDD FR1 E,			
	NR_TDD_FR1_E			
	NR FDD FR1 F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
<u> </u>	1 1	I	l .	

$\hat{E}_{s}/I_{ot}$		1~6	dB	-3
$\hat{E}_s/N_{oc}$		1~6	dB	-3
SS-RSRP Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B	1,2,4,5	dBm/SCS	-107
	NR_TDD_FR1_C  NR_FDD_FR1_D, NR_TDD_FR1_D  NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_F NR_FDD_FR1_G NR_FDD_FR1_H			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_F NR_FDD_FR1_F NR_FDD_FR1_G NR_FDD_FR1_H	3,6		-104
Io Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5  NR_FDD_FR1_B  NR_TDD_FR1_C  NR_FDD_FR1_D, NR_TDD_FR1_D  NR_FDD_FR1_E, NR_TDD_FR1_E  NR_FDD_FR1_F  NR_FDD_FR1_F  NR_FDD_FR1_G  NR_FDD_FR1_H	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_F NR_FDD_FR1_F NR_FDD_FR1_G NR_FDD_FR1_H	3,6	dBm/38.16 MHz	-68.18
Propagation	n condition	1~6		AWGN
Antenna co	nfiguration	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.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this
	test on hand n51 in this release of the specification

Table A.4A.2.1.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell	Frame boundary offset between PCell and
	and PSCell	PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

# A.4A.2.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and E-UTRAN target cell. The reported SFTD accuracy shall fulfil the requirement in clause 10.1.21.1.

# 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 clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.1.1-1. UE capable of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.1.1-2 and Table A.5.3.2.2.1.1-3.

Table A.5.3.2.2.1.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Config Description				
1		LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
		mode		
2		LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
		mode		
Note:	Note: The UE is only required to be tested in one of the supported test configurations 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

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1,2		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1,2		TRS.2.1 TDD	
Duplex Mode for Cell 2	Config 1,2		TDD	

TDD Configuration	Config 1,2		TDDConf.3.1	
BW <sub>channel</sub> Config 1		MHz	100: N <sub>RB,c</sub> = 24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference Config 1,2			SR.3.1 TDD	As defined in A.3.1.1.
Channel Note 2				
RMSI CORESET	Config 1,2		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
Dedicated CORESET	Config 1,2		CCR.3.1 TDD	
Reference Channel				
NR RF Channel Numbe			1	
EPRE ratio of PSS to SS		dB		
EPRE ratio of PBCH_DI		dB		
EPRE ratio of PBCH to		dB		
EPRE ratio of PDCCH_I	DMRS to SSS	dB	0	
EPRE ratio of PDCCH to		dB		
	EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS		dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δul	As defined in TS 38.331 [2]. $\Delta_{UL}$ is derived from the uplink calibration process Note 3
Configured UE transmitt	ed power (	dBm	maximum value configurable	As defined in clause
$P_{\mathrm{CMAX, f, c}}$ )			for certain power class	6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +Δ <sub>DL</sub>	RSRP_69 corresponds to -88dBm. $\Delta_{DL}$ is derived from the downlink calibration process Note 4
preambleReceivedTargetPower		dBm	-100	As defined in TS 38.331 [2].
Note 1: OCNG shall b	ne used such that a d	constant total tra	nsmitted power spectral density	is achieved for all OFDM

- Note 1: OCNG shall be used such that 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.
- Note 3: The ΔυL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The Δ<sub>DL</sub> value is calculated as (RSRP\_REP RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value.

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 1	As defined in A.3.15.1
Assumption f	or UE beams <sup>Note 3</sup>		Rough	
	Es Note1	dBm/SCS	-80.6	Power of SSB with index
SSB with	SSB_RP	dBm/SCS	-80.6	0 is set to be above
index 0				configured rsrp-
index 0				ThresholdSSB
	Es/Iot <sub>BB</sub>	dB	21.09	

	lo	dBm/95.04	-56.01	lo in symbols containing
		MHz		SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
	SSB_RP	dBm/SCS	-95.0	1 is set to be below
OOD with				configured rsrp-
SSB with index 1				ThresholdSSB
index i	Es/lot <sub>BB</sub>	dB	6.69	
	lo	dBm/95.04	-70.41	lo in symbols containing
		MHz		SSB index 1
Propagation Condition		-	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: Void

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

#### A.5.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.5.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

A.5.3.2.2.1.2.5 Void

A.5.3.2.2.1.2.6 Void

# A.5.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.5.3.2.2.2 Non-contention based random access test in FR2 for PSCell/SCell in EN-DC

### A.5.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.2.1-1. UE capable 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). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.5.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

	Config	Description	
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex	
	ı	mode	
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex	
	2	mode	
Note: The UE is only required to be tested in one of the supported test configurations depending on UE			
	capability		

Table A.5.3.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parame	ter	Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS	Config 1,2		N/A	CSI-RS.3.1	As defined in A.3.1.4
Configuration	, ,			TDD	
CSI-RS for tracking	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD	
Duplex Mode for	Config 1,2		TDD	TDD	
Cell 2	,				
TDD Configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1	
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 24	100: N <sub>RB,c</sub> = 24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference	Config 1,2		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
Channel Note 2	_				
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD	As defined in A.3.1.2
Reference Channel					
Dedicated	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD	
CORESET					
Reference Channel					
NR RF Channel Num			1	1	
EPRE ratio of PSS to		dB			
EPRE ratio of PBCH		dB			
EPRE ratio of PBCH	to	dB			
PBCH_DMRS					
EPRE ratio of PDCC	H_DMRS to	dB			
SSS	11.	in .	0	0	
EPRE ratio of PDCC	H to	dB		_	
PDCCH_DMRS	L DMD0 /	in .			
EPRE ratio of PDSCI		dB			
EPRE ratio of PDSCI PDSCH_DMRS	H to	dB			
ss-PBCH-BlockPowe	er	dBm/ SCS	+20 +Δul	+20 +Δ∪L	As defined in TS
			002	00	38.331 [2].
					$\Delta_{UL}$ is derived from the
					uplink calibration
					process Note 3
Configured UE transmitted power (		dBm	maximum value	maximum	As defined in clause
$P_{\text{CMAX. f.c}}$ )			configurable for	value	6.2.4 in TS 38.101-2
CWAA, 1, C			certain power	configurable for	[19]
			class	certain power	
				class	
PRACH Configuration	n		FR2 PRACH	FR2 PRACH	As defined in A.3.8.3,
			configuration 2	configuration 3	with exceptions as
					defined below
rsrp-ThresholdSSB		dBm	RSRP_69 +∆ <sub>DL</sub>	RSRP_69 +∆ <sub>DL</sub>	RSRP_69 corresponds
					to -88dBm. Δ <sub>DL</sub> is

					derived from the downlink calibration process Note 4			
preambleReceivedTargetPower		dBm	-100	-100	As defined in TS 38.331 [2]			
Note 1:	OCNG shall be used such that 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.							
Note 3:	The $\Delta_{\text{UL}}$ value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, <i>preambleReceivedTargetPower</i> = -100dBm and <i>ss-PBCH-BlockPower</i> = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.							
Note 4:	The $\Delta_{DL}$ value is calculated as (RSRP_REP - RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP.							

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

For a Reported value RSRP\_x, x is treated as a positive integer value.

Parameter		Unit	Test-1	Test-2	Comments
AoA setup			Setup 1	Setup 1	As defined in A.3.15.1
Assumption for UE beams <sup>Note 3</sup>			Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/lot <sub>BB</sub>	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below
SSB with	SSB_RP	dBm/SC S	-95.0	-95.0	configured rsrp- ThresholdSSB
index 1	Es/lot <sub>BB</sub>	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

# A.5.3.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

#### A.5.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions

associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

### A.5.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access

Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.5.3.2.3 Void

# A.5.4 Timing

# A.5.4.1 UE transmit timing

## A.5.4.1.1 NR UE Transmit Timing Test for FR2

#### A.5.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 5.4.1.1.1-1.

Table A.5.4.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.1.1-2 and A.5.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.1.1-3.

Table A.5.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2	Freq1	Freq1	
Duplex Mode		1,2	TE	)D	
TDD configuration		1,2	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	1,2	100: N <sub>F</sub>	RB,c = 66	
Data RBs allocated		1,2	6	6	
Initial BWP Configuration		1,2	DLBW	/P.0.1	
Illitial BVVF Colliguration		1,2	ULBW	/P.0.1	
Dedicated BWP		DLBW	/P.1.1		
Configuration		1,2	ULBW	/P.1.1	
TRS Configuration	•	1,2	TRS.2.	.1 TDD	

_	,		1		
PDSCH/PDCCH TCI		1,2	TOLS	tate.2	
state		ř			
DRx Cycle	ms	1,2	N/A	DRX.8 <sup>Note5</sup>	
PDSCH Reference		1,2	SD 2	3 TDD	
measurement channel		1,2	SN.3.	טטו מ	
RMSI CORESET		1,2	CD 3	2 TDD	
Reference Channel		1,∠	CR.S.	עטו צ	
Dedicated CORESET		4.0	CCD 2	7 TDD	
Reference Channel		1,2	CCR.3	.7 TDD	
OCNG Patterns		1,2	OF	P.1	
SSB Configuration		1,2	SSB.4	4 FR2	
SMTC Configuration		1,2	SMT	ΓC.1	
PDSCH/PDCCH	1.1.1-	1,2	4.6	20	
subcarrier spacing	kHz	,	12	20	
EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH					
DMRS to SSS					
EPRE ratio of PBCH to					
PBCH DMRS					
EPRE ratio of PDCCH					
DMRS to SSS					
EPRE ratio of PDCCH to	dB	4.0		0	
PDCCH DMRS	ав	1,2	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		1,2	AW		
SRS Config		1,2	SRSConf.1 <sup>Note6</sup>	SRSConf.2 <sup>Note6</sup>	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		Setup 1 according to clause A.3.15.	
Assumption for UE beams <sup>Note</sup>		Fine	
$N_{oc}^{ m Note1}$	dBm/15kHz <sup>Note4</sup>	-112	
$N_{oc}^{ m Note1}$	dBm/SCS <sup>Note3</sup>	-100	
$\hat{E}_s/N_{oc}$	dB		4
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-(	96
$\hat{E}_{s}/I_{ot}$	dB		4
Io <sup>Note2</sup>	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:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	Void
Note 4:	Equivalent power received by an antenna with 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:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches N <sub>RB,c</sub>
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1,0	sl2560,4	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.5.4.1.1.1-4: Void

# 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
  - b. The  $T_e$  values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.1.2-1

Table A.5.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
240	+8*64Tc	+4*64T <sub>c</sub>	

- 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 7.1.2.1-1 until the UE transmit timing offset is within ( $N_{TA} + N_{TA\_offset}$ ) ×T<sub>c</sub> ± T<sub>e</sub> respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within  $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$  of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

# A.5.4.2 UE timer accuracy

# A.5.4.3 Timing advance

## A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

#### A.5.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

### A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.5.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.5.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is	only 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		31	$N_{TA\_new} = N_{TA\_old}$ for the purpose of
(T <sub>A</sub> ) value during T1			establishing a reference value from
			which the timing advance adjustment
			accuracy can be measured during T2
Timing Advance Command		39	For 120 kHz SCS NTA_new = NTA_old +
(T <sub>A</sub> ) value during T2			1024*Tc (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

Parameter	Unit	Test1		
Parameter	Onit	T1	T2	
Duplex mode		TD	DD	
TDD configuration		TDDCc	onf.3.1	
BW <sub>channel</sub>	MHz	100: N <sub>R</sub>	$_{\rm B,c} = 66$	
BWP BW	MHz	100: N <sub>R</sub>	$_{\rm B,c} = 66$	
DRx Cycle	ms	Not App	olicable	
PDSCH Reference measurement channel		SR.3.1 TDD		
RMSI CORESET Reference Channel		CR.3.1	I TDD	
Dedicated CORESET Reference Channel		CCR.3.	1 TDD	
TRS configuration		TRS.2.1 TDD		
PDSCH/PDCCH TCI state		TCI.State.2		
OCNG Patterns		OCNG pattern 1		
SMTC configuration		SMTC.1 FR2		
SSB configuration		SSB.3 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	U
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
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	Test 1		
			T1	T2	
	arrival configuration		Setup 1 according	to clause A.3.15.1	
Assumption for UE beams <sup>Note</sup>			Fine		
$N_{oc}$ Note1		dBm/15kHz <sup>Note4</sup>	-112		
$N_{oc}$ Note1		dBm/SCS <sup>Note3</sup>	-10	03	
$\hat{E}_s/N_{oc}$		dB	4		
SS-RSRF	Note2	dBm/SCS Note4	-99		
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ dB 4		4		
Io <sup>Note2</sup>		dBm/95.04 MHz Note4	-68	3.5	
Note 1:		er cells and noise sources no rriers and time and shall be m			
	for $N_{\!oc}$ to be fulfille	d.			
Note 2:		els have been derived from o		nformation	
		not settable parameters them			
Note 3:	Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4:	·				
Note 5:	Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone				
Note 6:		oes of UE beam is given in B. st system implementation	.2.1.3, and does not li	mit UE	

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	For any any house in a disable d
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=4	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	transmission Comb setting			
cyclicShift-n2	0	transmissionComb setting			
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission			
Note: For further information see cla	use 6.3.2 in TS 38	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 clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

# A.5.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

## A.5.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.1.1-1. The test parameters are given in Tables A.5.5.1.1.1-2, A.5.5.1.1.1-3, and A. 5.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. 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 addition to RLM-RS radio link

monitoring using SSB index 0 and SSB index 1, the 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	nfiguration 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.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Parameter			Unit	Value
				Test 1
Active E-UTRA PCell				Cell 1
E-UTRA RF Ch				1
Active PSCell				Cell 2
RF Channel Nu	umber			2
Duplex mode		Config 1, 2		TDD
BW <sub>channel</sub>		Config 1, 2		100: N <sub>RB,c</sub> = 66
Data RBs alloc	ated	Config 1, 2		24
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1
DL dedicated E		Config 1, 2		DLBWP.1.1
configuration				
UL initial BWP		Config 1, 2		ULBWP.0.1
UL dedicated E	BWP	Config 1, 2		ULBWP.1.1
configuration				
TDD Configura	tion	Config 1, 2		TDDConf.3.1
RMSI CORESI	ET Reference	Config 1, 2		CR.3.1 TDD
Channel				
Dedicated COF	-	Config 1, 2		CCR.3.4 TDD
Reference Cha				
SSB Configura		Config 1, 2		SSB.1 FR2
SMTC Configu		Config 1, 2		SMTC.1
PDSCH/PDCC	H subcarrier	Config 1, 2		120 KHz
spacing		0 " 1 0		T. I.I. A 0.004
PRACH Config		Config 1, 2		Table A.3.8.3.1
SSB index assi RS		Config 1, 2		0,1
	OCNG parameters			OP.5
CP length				Normal
Out of sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM		2
parameters	symbols			
	Aggregation le		CCE	8
		hetical PDCCH RE	dB	4
	energy to ave	rage SSS RE		
	energy			
	Ratio of hypothetical PDCCH		dB	4
		to average SSS RE		
	energy DMRS precoder g			REG bundle size
	REG bundle s	iei granulanty		REG bundle size
DRX	I IVER DULIDIE S	ni40		OFF
Gap pattern ID				gp0
Layer 3 filtering				gρυ Enabled
	1		me	O Enabled
T310 timer			ms	U

T311 timer		ms	1000		
N310		-	1		
N311			1		
CSI-RS for CSI reporting Co	onfig 1, 2		CSI-RS.3.1 TDD		
reportConfigType			periodic		
reportQuantity			cri-RI-PMI-CQI		
CSI reporting periodicity		slot	40		
CSI reporting offset		slot	4		
TCI states for PDCCH/PDSCH			TCI.State.2		
CSI-RS for tracking Co	onfig 1, 2		TRS.2.1 TDD		
T1		S	0.2		
T2		S	9.68		
T3		S	9.68		
D1		s	9.64		
Note 1: All configurations are as	عال عطه علام	rior to the o	tart of time paried T1		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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

Table A.5.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Param	neter	Unit	Test 1						
			T1	T2	Т3	T1	T2	Т3	
AoA setup				Setup 3 defined in A.3.15					
				AoA1			AoA2		
Assumption for UE bea	ams <sup>Note 5</sup>			Rough			Rough		
EPRE ratio of PDCCH	DMRS to SSS	dB		4					
EPRE ratio of PDCCH	to PDCCH DMRS	dB							
EPRE ratio of PBCH D	MRS to SSS	dB							
EPRE ratio of PBCH to	PBCH DMRS	dB							
EPRE ratio of PSS to \$	SSS	dB		0			Not sent		
EPRE ratio of PDSCH	DMRS to SSS	dB		U			NOL SELL		
EPRE ratio of PDSCH	to PDSCH DMRS	dB							
EPRE ratio of OCNG [	MRS to SSS	dB							
EPRE ratio of OCNG to	OCNG DMRS	dB							
ssb-Index 0 SNR	Config 1, 2	dB	2 <sup>Note 6</sup>	-6 <sup>Note 6</sup>	-15				
ssb-Index 1 SNR	Config 1, 2			Not sent		2 <sup>Note 6</sup>	-15	-15	
$N_{oc}$	Config 1, 2	dBm/ 15kHz	-92.1 -92.1						
Time multiplexing of th transmissions from each			Defined in Figure A.5.5.1.1.1-2						
Propagation condition	· · · · · · · · · · · · · · · · · · ·		TDL	-A 30ns 7	'5Hz	TDL	-A 30ns 7	75Hz	
	be used such that a c	onstant to	tal transi	mitted pov	ver spect	ral densit	v is achie	ved for	
all OFDM sy					•	•	,		
Note 2: The signal contains PDCCH for UEs other than the device under test as part of						s part of C	CNG.		
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						For			
	UE which supports 4R								
	Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or						tion or		
	implementation								
Note 6: This value a	Illows up to 1dB degra	dation fro	m applied	SNR to U	JE baseb	and			

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

Note 1: E-UTRAN PCell and PSCell are SFNsynchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).

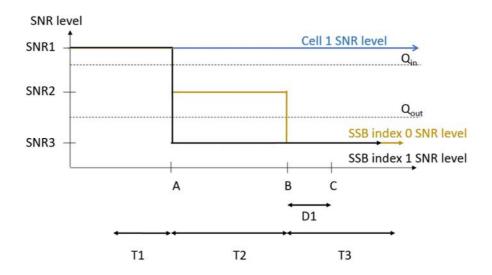


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

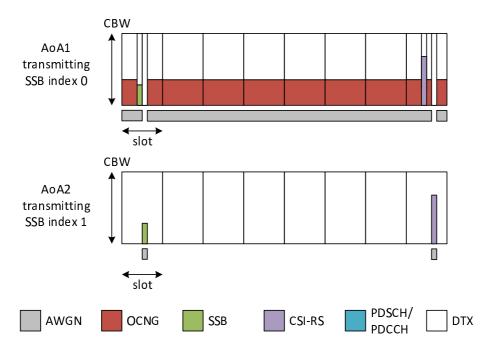


Figure A.5.5.1.1.1-2: Time multiplexed downlink transmissions

### A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

#### A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. 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 UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Paramete	r	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW <sub>channel</sub>	Config 1, 2		100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1, 2		24
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

		T =		
TDD Configurat				TDDConf.3.1
	SI CORESET Reference Config 1, 2			CR.3.1 TDD
Channel				
	Dedicated CORESET Config 1, 2			CCR.3.1 TDD
Reference Char		0 " 1 0		000 4 500
SSB Configurati		Config 1, 2		SSB.1 FR2
SMTC Configura		Config 1, 2		SMTC.3
PDSCH/PDCCH	H subcarrier	Config 1, 2		120 KHz
spacing		0 " 1 0		T.I.I. A.O.O.A
PRACH Configu	uration	Config 1, 2		Table A.3.8.3.1
SSB index assig	gned as RLM	Config 1, 2		0,1
RS				00.5
OCNG paramet	ers			OP.5
CP length	DOI ( )			Normal
In sync	DCI format			1-0
transmission		trol OFDM symbols	205	2
parameters	Aggregation lev	vei	CCE	4
		etical PDCCH RE	dB	0
	energy to avera	age SSS RE energy	40	
	Ratio of hypoth		dB	0
		to average SSS RE		
-	energy			DEC horadio sino
-	DMRS precode			REG bundle size
Out of sums	REG bundle siz	ze		6
Out of sync transmission	DCI format	stral OFDM aymobala		1-0
		trol OFDM symbols	005	2
parameters	Aggregation lev		CCE	8
		etical PDCCH RE	dB	4
-	Ratio of hypoth	age SSS RE energy	dB	4
		to average SSS RE	ub	4
	energy	io average 333 NE		
-	DMRS precode	ar granularity		REG bundle size
	REG bundle siz			6
DRX	INEO Duridie 312	26		OFF
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310			1113	1
N311				<u>'</u> 1
CSI-RS for CSI	reporting	Config 1, 2	<del>                                     </del>	CSI-RS.3.1 TDD
reportConfigTyp		Joining 1, 2	<del>                                     </del>	periodic
reportQuantity	,,,		<del>                                     </del>	cri-RI-PMI-CQI
				40
	CSI reporting periodicity CSI reporting offset			4
TCI states for PDCCH/PDSCH			slot	TCI.State.2
	CSI-RS for tracking Config 1, 2			TRS.2.1 TDD
T1				0.2
T2			S S	0.2
T3				1.88
T4			s 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

Parai	meter	Unit	Test 1									
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup						Setu	p 3 defi	ned in A	.3.15			
	Note F				AoA1					AoA2		
Assumption for					Rough					Rough		
EPRE ratio of P to SSS		dB			0			_				
EPRE ratio of P PDCCH DMRS	DCCH to	dB										
EPRE ratio of P	BCH DMRS to	dB										
EPRE ratio of P DMRS	BCH to PBCH	dB										
EPRE ratio of P	SS to SSS	dB	]									
EPRE ratio of P to SSS	DSCH DMRS	dB		0		Not sent						
EPRE ratio of P PDSCH DMRS	DSCH to	dB										
EPRE ratio of O	CNG DMRS to	dB										
EPRE ratio of O	CNG to OCNG	dB										
ssb-Index 0 SNR	Config 1, 2	dB	2 <sup>Note</sup> 6	6 <sup>Note</sup>	-15	-15	-15					
ssb-Index 1 SNR	Config 1, 2			1	Not sen	t		2 <sup>Note</sup> 6	-15	-15	-4.5	2 <sup>Note</sup> 6
$N_{oc}$	Config 1, 2	dBm/ 15kHz	-92.1				-92.1					
Time multiplexir downlink transmeach AoA			Defined in Figure A.5.5.1.2.1-2									
Propagation cor			TDL-A 30ns 75Hz TDL-A 30ns 75Hz				· · · · · · · · · · · · · · · · · · ·					
Note 1: OCN	G shall be used s	such that a	a constant total transmitted power spectral density is achieved for all									

Note 1: OCNG shall be used such that 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.

Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

#### Table A.5.5.1.2.1-4: Void

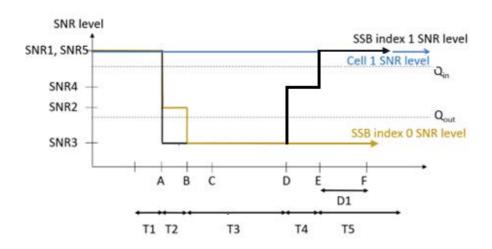


Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

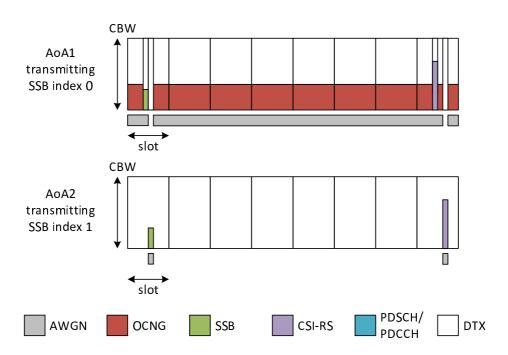


Figure A.5.5.1.2.1-2: Time multiplexed downlink transmissions

## A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

### A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2 TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The	UE is only required to pass in one of the supported test configurations in FR2

Table A.5.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

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, 2		TDD
BW <sub>channel</sub>	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration	Config 1, 2		TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel			
Dedicated CORESET	Config 1, 2		CCR.3.4 TDD
Reference Channel			
SSB Configuration	Config 1, 2		SSB.1 FR2
SMTC Configuration	Config 1, 2		SMTC.1

PDSCH/PDCCH	- I subcarrier	Config 1, 2		120 KHz
spacing				
PRACH Configu	uration	Config 1, 2		Table A.3.8.3.1
SSB index assignment	gned as RLM	Config 1, 2		0,1
RS				
OCNG paramet	ters			OP.1
CP length				Normal
Out of sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation level		CCE	8
		netical PDCCH RE	dB	4
		age SSS RE energy		
		netical PDCCH	dB	4
	• • • • • • • • • • • • • • • • • • • •	to average SSS RE		
	energy			
	DMRS precode			REG bundle size
	REG bundle si	ze		6
DRX Configurat	tion			DRX.3
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311		T		1
CSI-RS for CSI		Config 1, 2		CSI-RS.3.1 TDD
reportConfigTyp	oe			periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting po			slot	40
CSI reporting of			slot	4
TCI states for P				TCI.State.2
CSI-RS for trac	king	Config 1, 2		TRS.2.1 TDD
T1			S	0.2
T2			S	14.48
T3			S	14.48
D1	·		s	14.44
		e assigned to the UE p		art of time period T1.
Note 3: E-UT	RAN is in non-	ORX 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

Paramete	er	Unit	Test 1			
			T1	T2	T3	
AoA setup		Set	up 1 defined in A	3.15		
Assumption for UE beams	Note 5			Rough		
EPRE ratio of PDCCH DM	RS to SSS	dB	4			
EPRE ratio of PDCCH to F	PDCCH DMRS	dB	0			
EPRE ratio of PBCH DMR	S to SSS	dB				
EPRE ratio of PBCH to PE	CH DMRS	dB				
EPRE ratio of PSS to SSS	i	dB				
EPRE ratio of PDSCH DM	RS to SSS	dB		0		
EPRE ratio of PDSCH to F	dB					
EPRE ratio of OCNG DMRS to SSS		dB				
EPRE ratio of OCNG to O	EPRE ratio of OCNG to OCNG DMRS					
ssb-Index 0 SNR	Config 1, 2	dB	2 <sup>Note 6</sup>	-6 <sup>Note 6</sup>	-15	
ssb-Index 1 SNR	Config 1, 2		2 <sup>Note 6</sup>	-15	-15	

$N_{oc}$		Config 1, 2	dBm/15K Hz	-104.7dBm
Propagat	ion condition	1		TDL-A 30ns 75Hz
Note 1:				Cell 2 are fully allocated and a constant total
	transmitted power	er spectral density is	s achieved fo	or all OFDM symbols.
Note 2:	The signal conta	ins PDCCH for UEs	other than t	he device under test as part of OCNG.
Note 3:	SNR levels corre	spond to the signal	to noise rati	o over the SSS REs.
Note 4:	The SNR values	are specified for te	sting a UE w	hich supports 2RX on at least one band. For
	testing of a UE w	hich supports 4RX	on all bands	, the SNR during T3 is A.3.6.
Note 5:	Information about	it types of UE beam	is given in E	3.2.1.3, and does not limit UE implementation
	or test system im	plementation	-	·
Note 6:	This value allows	up to 1dB degrada	ation from ap	plied SNR to UE baseband

Table A.5.5.1.3.1-4: Void

### Table A.5.5.1.3.1-5: Void

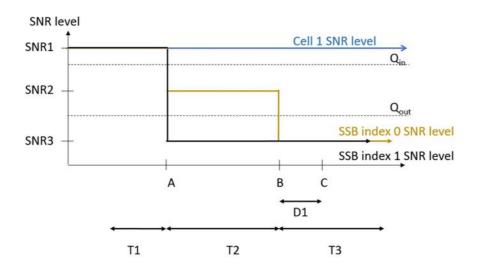


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

## A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

#### A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Asting E LITPA POSIT			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, 2		TDD
BW <sub>channel</sub>	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration	Config 1, 2		TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel			
Dedicated CORESET	Config 1, 2		CCR.3.1 TDD
Reference 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			

PRACH Config	uration	Config 1, 2		Table A.3.8.3.1
SSB index ass		Config 1, 2		0,1
RS				
OCNG parame	ters			OP.1
CP length	1			Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
		netical PDCCH RE age SSS RE energy	dB	0
	Ratio of hypoth DMRS energy		dB	0
	energy  DMRS precoder granularity			DEC.L. III.
				REG bundle size
0	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 age SSS RE energy	dB	4
	Ratio of hypoth		dB	4
		to average SSS RE		
	energy			
	DMRS precode	er granularity		REG bundle size
	REG bundle si	ze		6
DRX Configura	ition			DRX.11
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CS	l reporting	Config 1, 2		CSI-RS.3.1 TDD
reportConfigTy		, <u>J</u> ,		periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p	eriodicity		slot	40
CSI reporting of			slot	4
	PDCCH/PDSCH			TCI.State.2
CSI-RS for trac		Config 1, 2		TRS.2.1 TDD
T1	<u> </u>	··· <b>g</b> -, –	S	0.2
T2			S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88
D1			s	3.84
	onfigurations are	urations are assigned to the UE prior to the start of time period T1.		
Note 2: UE-	specific PDCCH	is not transmitted afte DRX mode under test.		co polica i ii

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

Parameter	Unit	t Test 1				
		T1	T2	Т3	T4	T5
AoA setup		Setup 1 defined in A.3.15			15	
Assumption for UE beams <sup>Note 5</sup>		Rough				
EPRE ratio of PDCCH DMRS to SSS	dB	0				

EPRE ratio of PDCCH t	o PDCCH DMRS	dB	0				
EPRE ratio of PBCH DI	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SS	dB					
EPRE ratio of PDSCH [	DMRS to SSS	dB	0				
EPRE ratio of PDSCH t	o PDSCH DMRS	dB					
EPRE ratio of OCNG D	MRS to SSS	dB	7				
EPRE ratio of OCNG to	OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	2 <sup>Note</sup>	-	-15	-4.5	2 <sup>Note 6</sup>
			6	6 <sup>Note</sup>			
				6			
ssb-Index 1 SNR	Config 1, 2		2 <sup>Note</sup>	-15	-15	-15	-15
			6				
$N_{oc}$	Config 1, 2	dBm/1		_	104.7dE	lm	
1 voc		5KHz	-104.7dBIII				
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.
- 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
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.4.1-4: Void

Table A.5.5.1.4.1-5: Void

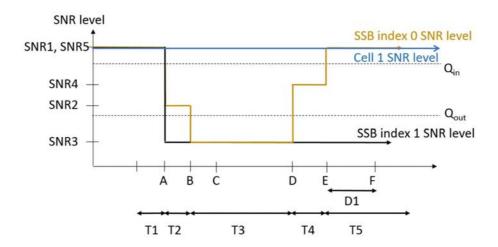


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

## 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 of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

Configuration Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

ı	Parameter		Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel I	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex Mode			TDD
BW <sub>channel</sub>	Config 1, 2		100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1, 2		24
BWoccupied	Config 1, 2		24
TDD Configuration	Config 1		TDDConf.3.1
	Config 2		TDDConf.3.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.4

			==
UL initial BWP	Config 1, 2		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1, 2		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel	3		
	Config 2		CR.3.1 TDD
Dedicated CORESET	Config 1		CCR.3.4 TDD
	Comig		
Reference Channel	0 " 0		CCR.3.6 TDD
	Config 2		CCR.3.4 TDD
			CCR.3.6 TDD
SSB Configuration	Config 1		SSB.1 FR2
	Config 2		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
January Commiguation	Config 2		SMTC.1
PDSCH/PDCCH			
	Config 1		120 KHz
subcarrier spacing	Config 2		120 KHz
001 00 ( 0114	-		D "11: TD0 0.1
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1
			TDD
			Resource #4 in TRS.2.2
			TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for Pl	DCCH#1/PDSCH		TCI.State.2
TCI configuration for Pl			TCI.State.3
OCNG parameters	DCCI 1#2		OP.5
CP length	1 = 2.4		Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH	dB	4
	RE energy to average CSI-		•
	RS RE energy		
	TO THE energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average		
	CSI-RS RE energy		
	51450		REG bundle size
	DMRS precoder granularity		1120 5411410 5125
	REG bundle size		6
DRX	THE STATISTIC CIES		OFF
			U 1
Can nottorn ID			an O
Gap pattern ID			gp0
Gap pattern ID  Layer 3 filtering			gp0 Enabled
Layer 3 filtering		me	Enabled
Layer 3 filtering T310 timer		ms	Enabled 0
Layer 3 filtering T310 timer T311 timer		ms ms	Enabled 0 1000
T310 timer T311 timer N310			Enabled 0 1000 1
T310 timer T311 timer N310 N311			Enabled  0 1000 1
T310 timer T311 timer N310	Config 1		Enabled  0 1000 1 1 1 CSI-RS.3.1 TDD
T310 timer T311 timer N310 N311 CSI-RS for CSI	Config 1 Config 2		Enabled  0 1000 1 1 1 CSI-RS.3.1 TDD
T310 timer T311 timer N310 N311 CSI-RS for CSI reporting			Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD
T310 timer T311 timer N310 N311 CSI-RS for CSI reporting reportConfigType			Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic
T310 timer T311 timer N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity	Config 2	ms	Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI
Layer 3 filtering  T310 timer T311 timer N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicit	Config 2	ms slot	Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40
Layer 3 filtering  T310 timer  T311 timer  N310  N311  CSI-RS for CSI reporting reportConfigType reportQuantity  CSI reporting periodicit CSI reporting offset	Config 2	slot slot	Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4
Layer 3 filtering  T310 timer  T311 timer  N310  N311  CSI-RS for CSI reporting reportConfigType reportQuantity  CSI reporting periodicit  CSI reporting offset  T1	Config 2	ms slot	Enabled  0 1000 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 0.2
Layer 3 filtering  T310 timer  T311 timer  N310  N311  CSI-RS for CSI reporting reportConfigType reportQuantity  CSI reporting periodicit CSI reporting offset	Config 2	slot slot	Enabled  0 1000 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4
Layer 3 filtering  T310 timer  T311 timer  N310  N311  CSI-RS for CSI reporting reportConfigType reportQuantity  CSI reporting periodicit  CSI reporting offset  T1	Config 2	slot slot slot	Enabled  0 1000 1 1 1 CSI-RS.3.1 TDD CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 0.2

D1	S	0.31
Note 1: UE-specific PDCCH is not transmitted after 1	1 starts.	
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	meter	Unit		Test 1					
			T1	T2	T3	T1	T2	T3	
AoA setup				Set	tup 3 defi	ned in A.3	3.15		
				AoA1			AoA2		
Assumption for UE be	eams <sup>Note 10</sup>			Rough			Rough		
EPRE ratio of PDCCH	H DMRS to SSS	dB		4					
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							
EPRE ratio of PDSCH	I DMRS to SSS	dB		0		Not sent			
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 RLM-RS1	Config 1, 2	dB	2 <sup>Note 11</sup>	-6 <sup>Note</sup>	-15				
SNR on RLM-RS2	Config 1, 2	dB		Not sent		2 <sup>Note 11</sup>	-15	-15	
$N_{oc}$	Config 1, 2	dBm/ 15kHz		-92.1			-92.1		
Propagation condition			TDL-A 30ns 75Hz TDL-A 30ns 75			75Hz			
Note 1: OCNG sha	II be used such that the	e resource	es in Cell 2	2 are fully	allocated	d and a co	onstant to	tal	
	I power spectral densit								
	resources for CSI repo								
Note 3: NZP CSI-R of time per	lS resource set configuion T1.	ıration for	CSI repor	ting are a	assigned	to the UE	prior to th	ne start	
Note 4: Measurem	ent gap configuration is	s assigned	to the UI	E prior to	the start	of time pe	riod T1.		
Note 5. The timers	and layer 3 filtering re	lated nara	matare ar	a configu	rad prior	to the ctar	t of time	noriod	

- 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.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

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			
	rieiu	Value		
	gapOffset	0		
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m	oundary RS is		
	gap)			

#### Table A.5.5.1.5.1-4: Void

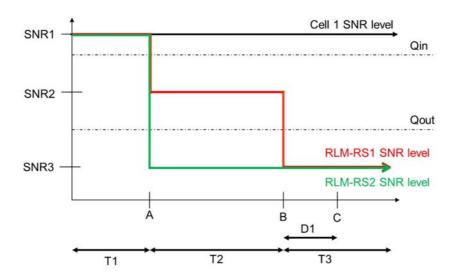


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

### 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 of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Configur	ation	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 Po			Cell 1
E-UTRA RF Chan	nel Number		1
Active PSCell			Cell 2
RF Channel Numl	per		2
Duplex Mode	<b>.</b>		TDD
BW <sub>channel</sub>	Config 1, 2		100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1, 2		24
BW <sub>occupied</sub>	Config 1, 2		24
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.1.4
configuration UL initial BWP	Config 1, 2		ULBWP.0.1
configuration	3 /		
UL dedicated BWP	Config 1, 2		ULBWP.1.4
configuration			00.0 / TDD
RMSI CORESET Reference	Config 1		CR.3.1 TDD
Channel		-	
	Config 2		CR.3.1 TDD
Dedicated CORESET	Config 1		CCR.3.1 TDD CCR.3.3 TDD
Reference Channel	Config 2		CCR.3.1 TDD CCR.3.3 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2	<b>i</b>	SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2	<b>i</b>	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	S		OP.5
	TRS configuration		TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PDCCH#1/PDSCH			TCI.State.2
TCI configuration			TCI.State.3

CD longth			Normal
CP length	DCI formet		
Out of sync transmission	DCI format		1-0 2
	Number of Control		2
parameters	OFDM symbols	CCE	0
	Aggregation level	CCE	<u>8</u> 4
	Ratio of hypothetical PDCCH RE energy to	dB	4
	average CSI-RS RE		
	•		
	energy	in.	
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy		
	to average CSI-RS RE		
	energy		DE0.1 11 1
	DMRS precoder		REG bundle size
	granularity		
In avena	REG bundle size		<u>6</u> 1-0
In sync transmission	DCI format		
parameters	Number of Control		2
parameters	OFDM symbols	CCE	1
	Aggregation level Ratio of hypothetical	CCE dB	<u>4</u> 0
	PDCCH RE energy to	uБ	U
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy	uБ	U
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		NEO Barraio 3120
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		me	1000
T311 timer		ms ms	1000
N310		1110	1
N311			<u>'</u> 1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodicity		slot	40
CSI reporting offset		slot	4
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
	ecific PDCCH is not transmit		S.
Note 2: E-UTRA	N is in non-DRX mode unde	r 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

Para	ameter	Unit	Unit Test 1									
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15									
					AoA1					AoA2		
Assumption f beams <sup>Note 10</sup>	or UE		Rough Rough									
EPRE ratio of DMRS to SS		dB			0							
EPRE ratio of PDCCH DMF		dB										
EPRE ratio of to SSS	f PBCH DMRS	dB										
EPRE ratio of PBCH DMRS		dB										
EPRE ratio o	f PSS to SSS	dB										
EPRE ratio of DMRS to SS		dB			0					Not sent		
EPRE ratio of PDSCH DMR	f PDSCH to	dB			-							
EPRE ratio of to SSS	f OCNG DMRS	dB										
EPRE ratio of OCNG DMRS		dB										
SNR on RLM-RS1	Config 1, 2	dB	2 <sup>Note</sup> 11	-6 <sup>Note</sup>	-15	-15	-15					
SNR on RLM-RS2	Config 1, 2	dB			Not sent			2 <sup>Note</sup> 11	-15	-15	-4.5	2 <sup>Note 6</sup>
$N_{oc}$	Config 1, 2	dBm/ 15KHz	-92.1 -92.1									
Propagation of	condition			TDL	-A 30ns	75Hz		TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The 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.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

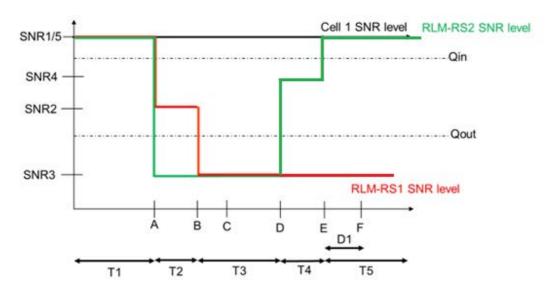


Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

# 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 DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. 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 Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS and are not same as RLM-RS to avoid triggering the beam failure during the RLM 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

Pa	Parameter		Value		
			Test 1		
Active E-UTRA	PCell		Cell 1		
E-UTRA RF Cha	annel Number		1		
Active PSCell			Cell 2		
RF Channel Nur	RF Channel Number		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 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		
RMSI CORESET Reference Channel	Config 1		CR. 3.1 TDD		
	Config 2		CR. 3.1 TDD		
Dedicated	Config 1		CCR. 3.4 TDD		
CORESET			CCR.3.6 TDD		
Reference	Config 2		CCR. 3.4 TDD		
Channel			CCR.3.6 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 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		
SSB index for BFD-RS	Config 1, 2		0, 1		
TRS configuration	TRS configuration		TRS.2.1 TDD		
TCI configuration			TRS.2.2 TDD TCI.State.2		
PDCCH#1/PDS0			TCI State 2		
TCI configuration			TCI.State.3 OP.1		
OCNG paramete	#15		Normal		
CP length			INOrmal		

Out of sync	DCI format		1-0			
transmission	Number of Control		2			
parameters	OFDM symbols		2			
parameters	Aggregation level	CCE	8			
	Ratio of hypothetical	dB	4			
	PDCCH RE energy to	ub	T			
	average CSI-RS RE					
	energy					
	Ratio of hypothetical	dB	4			
	PDCCH DMRS	42	·			
	energy to average					
	CSI-RS RE energy					
	DMRS precoder		REG bundle size			
	granularity					
	REG bundle size		6			
DRX	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			
reportConfigTyp	е		periodic			
reportQuantity			cri-RI-PMI-CQI			
CSI reporting pe		slot	40			
CSI reporting offset		slot	4			
T1		S	0.2			
T2		S	1.28			
ТЗ		S	1.28			
D1		S	1.24			
	pecific PDCCH is not tran		starts.			
Note 2: E-UTRAN is in non-DRX mode under test.						

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3
AoA setup		Setu	p 1 defined in A	.3.15
Assumption for UE beams <sup>Note 10</sup>			Rough	
EPRE ratio of PDCCH DMRS to SSS	dB		4	
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			
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			
SNR on RLM- RS1	Config 1, 2	dB	2 <sup>Note 11</sup>	-6 <sup>Note 11</sup>	-15
SNR on RLM- RS2	Config 1, 2		2 <sup>Note 11</sup>	-15	-15
N	Config 1	dBm/15KHz	-104.7		
$N_{oc}$	Config 2		-104.7		
Propagation cor	ndition			ΓDL-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: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

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

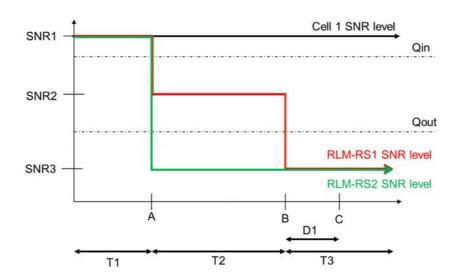


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

## 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 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 of 5ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS and are not same with RLM-RS to avoid triggering the beam failure during the RLM test.

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		
E-UTRA RF Channel Number			1		
	Active PSCell		Cell 2		
RF Channel N	umber		2		
Duplex Mode	T = " .		TDD		
TDD	Config 1		TDDConf.3.1		
Configuratio	Config 2		TDDConf.3.1		
DL initial	Config 1, 2		DLBWP.0.1		
BWP configuration	_				
DI	Config 1, 2		DLBWP.1.1		
dedicated BWP	Corning 1, 2		DEBWF.1.1		
configuration					
UL initial BWP	Config 1, 2		ULBWP.0.1		
configuration					
UL	Config 1, 2		ULBWP.1.1		
dedicated BWP					
configuration					
RMSI CORESET Reference	Config 1		CR.3.1 TDD		
Channel					
	Config 2		CR.3.1 TDD		
Dedicated	Config 1		CCR.3.1 TDD		
CORESET			CCR.3.3 TDD		
Reference	Config 2		CCR.3.1 TDD		
Channel			CCR.3.3 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		
SSB index for BFD-RS	Config 1, 2		0, 1		

TRS configura	tion		TRS.2.1 TDD	
11X3 configura	tion		TRS.2.2 TDD	
TCI configurat	ion for PDCCH#1/PDSCH		TCI.State.2	
TCI configuration for PDCCH#2			TCI.State.3	
OCNG parameters			OP.1	
CP length			Normal	
Out of sync	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
In sync	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	4	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX			DRX.3	
Gap pattern ID			gp0	
Layer 3 filterin	g		Enabled	
T310 timer		ms	2000	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for	Config 1		CSI-RS.3.1 TDD	
CSI reporting	Config 2		CSI-RS.3.1 TDD	
reportConfigTy	rpe		periodic	
reportQuantity			cri-RI-PMI-CQI	
CSI reporting periodicity		slot	40	
CSI reporting offset		slot	4	
T1			0.2	
T2		S	0.2	
T3		S	1.64	
T4 T5		S S	0.2 1.88	
D1			1.84	
Note 2: E-UTRAN is in non-DRX mode under test.				

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams <sup>Note 10</sup>			Rough				
EPRE ratio of SSS	PDCCH DMRS to	dB			0		
EPRE ratio of DMRS	PDCCH to PDCCH	dB					
EPRE ratio of SSS	PBCH DMRS to	dB					
EPRE ratio of DMRS	PBCH to PBCH	dB					
EPRE ratio of	PSS to SSS	dB	1				
EPRE ratio of SSS	PDSCH DMRS to	dB			0		
	PDSCH to PDSCH	dB	7				
EPRE ratio of SSS	OCNG DMRS to	dB					
EPRE ratio of DMRS	OCNG to OCNG	dB					
SNR on RLM-RS1	Config 1, 2	dB	2 <sup>Note 11</sup>	-6 <sup>Note 11</sup>	-15	-4.5	2 <sup>Note 11</sup>
SNR on RLM-RS2	Config 1, 2	dB	2 <sup>Note 11</sup>	-15	-15	-15	-15
$N_{oc}$	Config 1, 2	dBm/15KHz	-104.7				
Propagation c	ondition		TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The 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.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

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
		Value
	gapOffset	0
Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement		oundary RS is

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

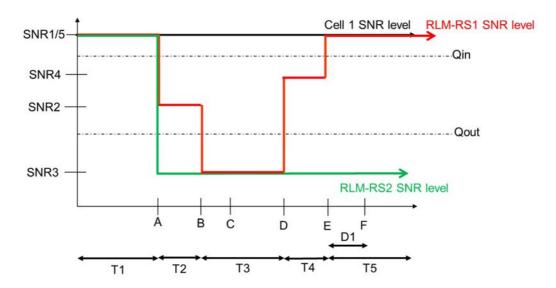


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

## A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

## A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

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 required to be tested in one of the supported test configurations.		

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1, 2	1 and 2	1 for NR PSCell and 2 for LTE PCell
SSB configuration		1, 2	SSB.1 FR2	
SMTC configuration		1, 2	SMTC	
			pattern 1	
DRX cycle length	S	1, 2	OFF	
T1	S	1, 2	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Се	II 2	
AoA setup		1, 2	Setup 3 defin	Setup 3 defined in A.3.15.3	
			AoA1	AoA2	
Assumption for UE			Rough	Rough	
beams <sup>Note 1</sup>					
TDD configuration		1, 2	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	1, 2	100: N <sub>F</sub>	RB,c = 66	
Data RBs allocated		1, 2	2	4	
PDSCH Reference		1, 2	SR.3.2 TDD	Not sent	
measurement					
channel					
RMSI CORESET		1, 2	CR.3.1 TDD	Not sent	
RMC configuration					
Dedicated CORESET		1, 2	CCR.3.2 TDD	Not sent	
RMC configuration					
TRS configuration		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.5 defined in	Not sent	
			A.3.2.1		
Initial DL BWP		1, 2	DLBV	/P.0.1	
configuration					
Initial UL BWP		1, 2	ULBV	/P.0.1	
configuration					
RLM-RS		1, 2	SSB with index	SSB with index	
			0	1	
$N_{oc}$	dBm/15kHz	1, 2	-92.1	-92.1	
$N_{oc}$ Note2	dBm/SCS	1, 2	-83.1	-83.1	

$\hat{E}_s/N_{oc}$	dB	1, 2	2	2
$\hat{E}_s/I_{ot\ BB}$ Note 4	dB	1, 2	1	1
SSB_RP Note3	dBm/SCS	1, 2	-81.1	-81.1
lo	dBm/95.04 MHz	1, 2	-54.35	-54.35
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defined in Figu	re A.5.5.1.9.1-1
Propagation Condition		1, 2	AWGN	AWGN

Note 1: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 2: Interference from other cells and noise sources not specified in the test is 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: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/Iot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

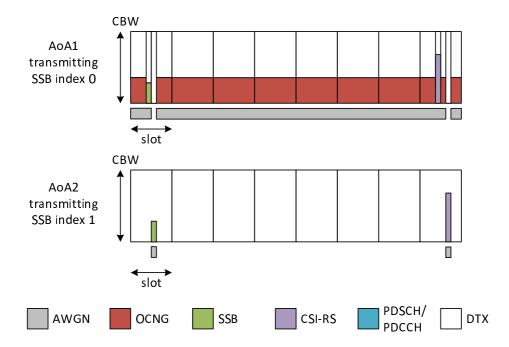


Figure A.5.5.1.9.1-1: Time multiplexed downlink transmissions

# A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

# A.5.5.2 Interruption

# A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

## A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.1.1-1.

The general test parameters are given in Table A.5.5.2.1.1-2, and NR cell specific test parameters are given in Table A.5.5.2.1.1-3 and A.5.5.2.1.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.1.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell on and Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description		
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
	2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only 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	
ld		011	
T1	S	6.25	

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
BWchannel	Config 1.2	MHz	100: Npp c = 66

Data RBs allocated	Config 1,2		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.3 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			_
EPRE ratio of PDCCH to PI			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)			
Ë <sub>s</sub> /N <sub>oc</sub>		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
NI 4 A CONO I III	1 1 41 41 4		11 4 1 1 4 4 4 1 1 24 1

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		Setup 1 according to clause A.3.15.1
Assumption for UE beams <sup>Note</sup>		Fine
$N_{oc}^{}$ Note1	dBm/15kHz <sup>Note4</sup>	-112
$N_{oc}^{}$ Note1	dBm/SCS <sup>Note3</sup>	-102.97
$\hat{E}_s/N_{oc}$	dB	17
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-85.97
$\hat{E}_{s}/I_{ot}$	dB	17
Io <sup>Note2</sup>	dBm/95.04 MHz Note4	-56.90

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power
for $N_{oc}$ to be fulfilled.
SSB_RP 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.
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
Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.5.5.2.1.1-5: Void

### A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.2.2 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

## A.5.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.2.1-1.

The general test parameters are given in Table A.5.5.2.2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.2.1-3 and A.5.5.2.2.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.2.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

C	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 me		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.6	DRX related parameters are defined in Table A.3.3.6-1
Measurement gap pattern Id		OFF	
T1	S	6.25	

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	Frequency Range		FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1,2		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	1		OP.1
SSB Configuration			SSB.3 FR2
SMTC Configuration	Config 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  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS		dB	0
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	62.5
Nata 4: OONO aballib	1 1 4 4 1	0 0 6 0-	all and all and a secretary total transcript of a second

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

	Parameter	Unit	Cell2			
Angle of	arrival configuration		Setup 1 according to clause A.3.15.1			
Assumpt 6	ion for UE beams <sup>Note</sup>		Fine			
$N_{oc}$ Note1	1	dBm/15kHz <sup>Note4</sup>	-112			
$N_{oc}$ Note1	ote1 dBm/SCS <sup>Note3</sup>		-102.97			
$\hat{E}_s/N_{od}$	c	dB	17			
SSB_RP	Note2	dBm/SCS Note4	-85.97			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	17			
Io <sup>Note2</sup>		dBm/95.04 MHz Note4	-56.90			
Note 1:			ot specified in the test is assumed to be nodelled as AWGN of appropriate power			
	for $N_{oc}$ to be fulfille	d.				
Note 2:	Note 2: SSB_RP 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:		Bi gain antenna at the centre	•			
Note 6:		pes of UE beam is given in B	.2.1.3, and does not limit UE			
	implementation or test system implementation					

Table A.5.5.2.2.1-5: Void

# A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.2.3 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

### A.5.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. The E-UTRAN cell specific test parameters can be found in 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 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. 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 re	equired 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, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
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 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	

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

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 <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1,2		66	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 configuration	Config 1,2		ULBWP.0.1	ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1	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	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR 3.1 TDD	CCR 3.1 TDD
OCNG Patterns			OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMR				0
EPRE ratio of PDCCH to PD		dB	dB 0	
EPRE ratio of PDSCH DMR				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)				
			AWGN	AWGN
Propagation Condition		_	AWGN	
Time offset to cell1 Note 2		μs	3	3+ Time offset to cell2
Time offset to cell2 Note 3		μs	-	3
Note 1: OCNC shall be used such that both calls are fully allocated and a constant total transmitted power				

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	meter	Unit	Cell 2	Cell 3
Angle of arrival configuration			Setup 1 defined in clause A.3.15	
Assumption for UE b	eams <sup>Note 6</sup>		Fine	Rough
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
Note1	NR_TDD_FR2_F	dBm/15kHz	-111.7	1047
00	NR_TDD_FR2_G	UDIII/ IOKIIZ	-111.7	-104.7
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
$N_{ m ac}$ Note1	NR_TDD_FR2_B		-102.7	-95.7
	NR_TDD_FR2_F	dBm/SCS <sup>Note</sup>		
00	NR_TDD_FR2_G	3		
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A	dBm/SCS		
SSB_RPNote2	NR_TDD_FR2_B	Note4	-90.7	-90.7
	NR_TDD_FR2_F			

	NR_TDD_FR2_G					
	NR_TDD_FR2_T					
	NR_TDD_FR2_Y					
	NR_TDD_FR2_A			5		
	NR_TDD_FR2_B					
$\hat{E}_{s}/I_{ot}$	NR_TDD_FR2_F	dB	12			
$\mathbf{L}_{\rm s}/1_{\rm ot}$	NR_TDD_FR2_G	ub	12	3		
	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	12	5		
L <sub>S</sub> /IV <sub>oc</sub>	NR_TDD_FR2_G	ub				
	NR_TDD_FR2_T					
	NR_TDD_FR2_Y					
	NR_TDD_FR2_A		-61.45	-60.52		
	NR_TDD_FR2_B	dBm/95.04 MHz <sup>Note4</sup>				
Io <sup>Note2</sup>	NR_TDD_FR2_F					
10	NR_TDD_FR2_G					
	NR_TDD_FR2_T					
	NR_TDD_FR2_Y					
Note 1:	Interference from other cells and constant over subcarriers and tim					
	for $N_{oc}$ to be fulfilled.					
Note 2:	SSB_RP and lo levels have been	derived from ot	her parameters for in	formation		
	purposes. They are not settable parameters themselves.					
Note 3:						
	noise at each receiver antenna po					
Note 4:	· ·					
Note 5:						
Note 6:						
	implementation or test system implementation					

## 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.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell 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.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in 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 in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

# A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.4.1-1.

The general test parameters are given in Table A.5.5.2.4.1-2, and NR cell specific test parameters are given in Table A.5.5.2.4.1-3 and A.5.5.2.4.1-4 below. The E-UTRAN cell specific test parameters can be found in 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 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. 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 mod				
Note:	Note: The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		Ι, Ζ	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	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 <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66	
Data RBs allocated	Config 1,2		66	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	CR.3.1 TDD	
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD	
OCNG Patterns			OP.1	OP.1	
SSB Configuration			SSB.1 FR2	SSB.1 FR2	
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2	
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD	
TCI state	Config 1,2		TCI.State.0	TCI.State.0	
EPRE ratio of 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 OC	EPRE ratio of OCNG to OCNG DMRS (Note 1)				
Propagation Condition			AWGN	AWGN	
Time offset to cell1 Note 2		μs	62.5	62.5+ Time offset to cell2	
Time offset to cell2 Note 3		μs	-	3	

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

	Parameter	Unit	Cell 2	Cell 3
Angle of arrival configuration			Setup 1 defined i	n clause A.3.15.1
Assumption for UE beams <sup>Note 6</sup>			Fine	Rough
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}$ Note1	NR_TDD_FR2_F	4D/4-51-11-	444 7	4047
oc .	NR_TDD_FR2_G	dBm/15kHz	-111.7	-104.7
	NR_TDD_FR2_T			
	NR TDD FR2 Y			

		NR_TDD_FR2_A				
3.7 Noted		NR_TDD_FR2_B		Ì		
$N_{oc}$ Note1		NR_TDD_FR2_F dBm/SC		-102.7	-95.7	
		NR_TDD_FR2_G	3	. • =	••••	
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
SSB_RPN	lote2	NR_TDD_FR2_F	dBm/SCS	-90.7	-90.7	
002		NR_TDD_FR2_G	Note4	•••	•••	
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
$\hat{ extbf{E}}_{ ext{s}}/ ext{I}_{ ext{ot}}$		dB	12	5		
$\hat{E}_s/N_{oc}$			dB	12	5	
		NR_TDD_FR2_A				
		NR_TDD_FR2_B		-61.45	-60.52	
Io <sup>Note2</sup>		NR_TDD_FR2_F	dBm/95.04			
10		NR_TDD_FR2_G	MHz Note4			
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
Note 1:		e from other cells and ver subcarriers and tim				
		be fulfilled.				
Note 2:	SSB RP a	nd lo levels have been	derived from ot	her parameters for in	formation	
	Note 2: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					
Note 3:						
	noise at each receiver antenna port.					
Note 4:	Equivalent	power received by an	antenna with 0d	Bi gain at the centre	of the quiet zone	
Note 5:		ed with 0dBi gain anten				
Note 6:	te 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE					
	implementation or test system implementation					

## 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.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell 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.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in 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 in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

## A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8.2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

The general test parameters are given in Table A.5.5.2.5.1-2, and NR cell specific test parameters are given in Table A.5.5.2.5.1-3 and A.5.5.2.5.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired 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, 3	One is NR RF channel and two are E- UTRAN RF channels
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 E-UTRAN RF channel number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP			DLBWP.0.1
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	Config 1,2		SR.3.1 TDD
measurement channel	Corning 1,2		311.3.1 100
RMSI CORESET	Config 1,2		CR.3.1 TDD
Reference Channel	Coming 1,2		O10.0.1 100
PDCCH CORESET	Config 1,2		CCR.3.1 TDD
parameters	Coming 1,2		
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 PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			AMONI
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

Parameter	Unit	Cell2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1
Assumption for UE beams <sup>Note</sup>		Fine
$N_{oc}^{}$ Note1	dBm/15kHz <sup>Note4</sup>	-112
$N_{oc}^{}$ Note1	dBm/SCS <sup>Note3</sup>	-102.97

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

			•		
$\hat{E}_s/N_{oc}$	c	dB	17		
SSB_RP	Note2	dBm/SCS Note4	-85.97		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17		
Io <sup>Note2</sup>		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:	<ol> <li>SSB_RP and lo levels have been derived from other parameters for information purposes.</li> <li>They are not settable parameters themselves.</li> </ol>				
Note 3:	, ,				
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zor			Bi 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

## 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.

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: Void

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 that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.6.1-1.

The general test parameters are given in Table A.5.5.2.6.1-2, and NR cell specific test parameters are given in Table A.5.5.2.6.1-3 and A.5.5.2.6.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as

NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired 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 2	One is NR RF channel and two are E-
		1, 2, 3	UTRAN RF channels
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 3.
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.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in asynchronous EN-DC

Parameter Unit Cell 2		Cell 2	
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW <sub>channel</sub>	Config 1,2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1,2		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 DMF	RS to SSS		
EPRE ratio of PBCH to P	BCH DMRS		
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to	PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to C	OCNG DMRS (Note 1)		
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	62.5

- 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: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E\_UTRAN SCC in asynchronous EN-DC

	Parameter	Unit	Cell2		
Angle of arrival configuration			Setup 1 according to clause A.3.15.1		
Assumption for UE beams <sup>Note</sup>			Fine		
$N_{oc}^{}$ Note1		dBm/15kHz <sup>Note4</sup>	-112		
$N_{oc}^{ m Note1}$		dBm/SCS <sup>Note3</sup>	-102.97		
$\hat{E}_s/N_{od}$	c	dB	17		
SSB_RP	Note2	dBm/SCS Note4	-85.97		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17		
Io <sup>Note2</sup>		dBm/95.04 MHz Note4	-56.90		
Note 1:	constant over subcarriers and time and shall be modelled as AWGN of appropriate power				
Note 2:			her parameters for information purposes.		
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.				
Note 4:	•				
Note 5:		Bi gain antenna at the centre			
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.2.1.3, and does not limit UE implementation or test system implementation				

# 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.

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: Void

The rate of correct events observed during repeated tests shall be at least 90%.

# A.5.5.3 SCell Activation and Deactivation Delay

## A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

#### A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1 except the SCell is in FR2 intraband.

The supported test configurations are shown in table A.5.5.3.1.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.1.1-2 and A.5.5.3.1.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

In this test it is assumed that the UE is receiving RRC messages pertaining to the SCell in SCG via signaling on SRB3.

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	s only required to pass in one of the supported test configurations

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell

Parameter <sup>Note 5</sup>	l lesit	Cell 2			Cell 3		
	Unit	T1	T2	T3	T1	T2	T3

SSB ARFCN		freq1	freq2		
Duplex mode		TDD	TDD		
TDD configuration		TDDConf.3.1	TDDConf.3.1		
BW <sub>channel</sub>	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66		
Data RBs allocated		66 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	VP.0.1		
DL dedicated BWP configuration		DLBV	VP.1.1		
UL initial BWP configuration		ULBV	VP.0.1		
UL dedicated BWP configuration		ULBV	VP.1.1		
OCNG Patterns		OI	P.1		
SMTC configuration		SMTC.1			
SSB configuration		SSB.1 FR2			
TCI state		TCI.State.0			
TRS configuration		TRS.2.1 TDD			
CSI-RS configuration for CSI reporting		CSI-RS.	3.1 TDD		
reportConfigType		periodic	N/A		
reportQuantity		cri-RI-PMI-CQI	N/A		
CSI reporting periodicity	slot	40	N/A		
CSI reporting offset	slot	4	N/A		
PDSCH/PDCCH subcarrier spacing	kHz	1:	20		
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB		0		
EPRE ratio of PDSCH_DMRS to SSS	uБ	'	U		
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>					
EPRE ratio of OCNG to OCNG DMRS Note					
1					
Propagation conditions		AW	/GN		

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

Parameter <sup>Note 6</sup>	Unit		Cell 2		Cell 3		
Parameter	Unit	T1	T2	Т3	T1	T2	T3
Angle of arrival configuration			Setu	p 1 accord	ding to A.3.	15.1	
Assumption for UE beams <sup>Note 7</sup>			Rough			Rough	
$N_{oc}$ Note1	dBm/15kHz <sup>N</sup> ote4	-104.7		-104.7			
$N_{oc}$ Note1	dBm/SCS <sup>Note</sup>	-95.7		-95.7 -95.7			
$\hat{E}_s/N_{oc}$	dB		7			7	
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-88.7 -88.7		-88.7			

$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		dB	7	7		
Io <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>	-58.92	-58.92		
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:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					
Note 3:	Void					
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 5:	Void					
Note 6:	All parameters apply for configuration 1 and 2					
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system					

## A.5.5.3.1.2 Test Requirements

implementation

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case.

# A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

## A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2

Configuration	Description
1	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to pass in one of the supported test configurations

Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit	Cell 2			Cell 3		
		Offic	T1	T2	T3	T1	T2	T3
SSB ARFCN			freq2			freq1		
Config 1,4			TDD		FDD			
Duplex mode	Config 2,3,5,6		TDD			TDD		

	Config 1,4			Not Applicable
TDD configuration	Config 2,5	_	TDDConf.3.1	TDDConf.1.1
1DD configuration		_	TDDC0III.3.1	
	Config 3,6			TDDConf.2.1
	Config 1,4			10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	Config 2,5	MHz	100: N <sub>RB,c</sub> = 66	10: N <sub>RB,c</sub> = 52
	Config 3,6			40: N <sub>RB,c</sub> = 106
	Config 1,4			52
Data RBs allocated	Config 2,5		66	52
	Config 3,6	1		106
DL initial BWP	Config		DI BV	VP.0.1
configuration	1,2,3,4,5,6		525.	
DL dedicated BWP configuration	Config 1,2,3,4,5,6		DLBV	VP.1.1
UL initial BWP	Config			WD 0.4
configuration	1,2,3,4,5,6		ULBV	VP.0.1
UL dedicated BWP	Config		ULBV	VP.1.1
configuration	1,2,3,4,5,6			plicable
DRX Cycle		ms	Νοι Αρ	
PDSCH Reference	Config 1,4	_	00.04.700	SR.1.1 FDD
measurement channel	Config 2,5	_	SR.3.1 TDD	SR.1.1 TDD
	Config 3,6			SR.2.1 TDD
RMSI CORESET	Config 1,4		00.04.700	CR.1.1 FDD
Reference Channel	Config 2,5	1	CR.3.1 TDD	CR.1.1 TDD
	Config 3,6			CR.2.1 TDD
RMC CORESET	Config 1,4		000 04 TDD	CCR.1.1 FDD
Reference Channel	Config 2,5		CCR.3.1 TDD	CCR.1.1 TDD
OCNG Patterns	Config 3,6		0	P.1
SMTC configuration				TC.1
TCI state			TCI.State.0	NA NA
10101010	Config 1,4		101.0.0.0	TRS.1.1 FDD
TRS configuration	Config 2,5	1	TRS.2.1 TDD	TRS.1.1 TDD
Tre comigaration	Config 3,6		11(0.2.1 122	TRS.1.2 TDD
	Config 1,2,4,5			SSB.1 FR1
SSB configuration	Config 3,6	1	SSB.1 FR2	SSB.2 FR1
	Config 1,4			CSI-RS.1.1 FDD
CSI-RS configuration		<u> </u>	CCL DC 0.4 TDD	
for CSI reporting	Config 2,5	<u> </u>	CSI-RS.3.1 TDD	CSI-RS.1.1 TDD
	Config 3,6			CSI-RS.2.1 TDD
PDSCH/PDCCH	Config 1,2,4,5	kHz	120kHz	15kHz
subcarrier spacing	Config 3,6			30kHz
reportConfigType	Config 1-6		periodic	N/A
reportQuantity	Config 1-6		cri-RI-PMI-CQI	N/A
CSI reporting periodicity	Config 1,2,3,4,5,6	slot	40	N/A
CSI reporting offset	Config	slot	4	N/A
	1,2,3,4,5,6	5151	7	1 1// 1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	S to SSS	-		
EPRE ratio of PBCH to PB	CH DMRS	1		
EPRE ratio of PDCCH DMRS to SSS		╡ !		
EPRE ratio of PDCCH to PDCCH DMRS		dB		0
EPRE ratio of PDSCH DMI		1		
EPRE ratio of PDSCH to P	DSCH			
EPRE ratio of OCNG DMR	S to SSS(Note 1)			
EPRE ratio of OCNG to OC Propagation condition	CNG DMRS (Note 1)		AWGN	NA

		Link only, see clause
		A.3.7A
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant tota	transmitted power spectral
	density is achieved for all OFDM symbols.	
Note 2:	Void	
Note 3:	Void	
Note 4:	The uplink resources for CSI reporting are assigned to the UE prior to the start	of time period T2.1

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		
		Offic	T1	T2	T3	T1	T2	T3	
Angle of arrival cor	nfiguration		Setup 1 according to clause A.3.15.1						
Assumption for UE	beams <sup>Note 7</sup>			Rough					
$N_{\!{}_{oc}}$ Note1		dBm/15kHz	-104.7						
$N_{oc}$ Note1	Config 1,2,4,5 Config 3,6	dBm/SCS		-95.7	95.7		<b></b>		
SSB_RPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3		-88.7		NA Link only, see claus A.3.7A			
$\hat{E}_s/N_{oc}$	Config 1,2,3,4,5,6	dB		7				A.3.7A	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	7						
Io <sup>Note2</sup>	Config 1,2,4,5	dBm/ChBw <sup>N</sup>	-58.92						
10	Config 3,6	ote4,Note6							
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over									

subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 2: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: ChBW is 95.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6 Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test

system implementation

## A.5.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, with the following exceptions:

- Placement of interruptions is only verified in NR PSCell.

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 as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.5.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.5.1-4 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 (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.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot  $m+T_{L1-RSRP}$ . In the next DL slot after slot  $m+T_{L1-RSRP}$ , the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

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 test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and 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 is 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
T2	s	2	During this time the UE shall activate the SCell.

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			
		Onit	T1			T1	T2	Т3	
SSB ARFCN				freq1			freq2		
Duplex mode	Config 1,4		FDD			TDD			
	Config 2,3,5,6			TDD			TDD		
	Config 1,4		No	ot Applicat	ble				
TDD configuration	Config 2,5	_	Т	DDConf.1	.1		TDDConf.3	3.1	
	Config 3,6		Т	DDConf.2	.1				
	Config 1,4		10	): N <sub>RB,c</sub> = \$	52				
BWchannel	Config 2,5	MHz	10	): N <sub>RB,c</sub> = \$	52	1	00: N <sub>RB,c</sub> =	: 66	
	Config 3,6		40	: N <sub>RB,c</sub> = 1	06				
Data RBs allocated	Config 1,4			52			66		
	Config 2,5			52					
	Config 3,6			106					
	Config 1,4		10	10: N <sub>RB,c</sub> = 52					
BWP BW	Config 2,5		10	10: N <sub>RB,c</sub> = 52		100: N <sub>RB,c</sub> = 66		: 66	
	Config 3,6		40	40: N <sub>RB,c</sub> = 106					
DRx Cycle		ms		Not Ap			oplicable		
PDSCH Reference	Config 1,4		;	SR.1.1 FDE	)				
measurement channel	Config 2,5		;	SR.1.1 TDD	)	SR.3.1 TDD			
measurement channel	Config 3,6		;	SR.2.1 TDE	)				
RMSI CORESET	Config 1,4		(	CR.1.1 FDE	)				
Reference Channel	Config 2,5		(	CR.1.1 TDE	)		CR.3.1 TD	D	
Reference Chamilei	Config 3,6		(	CR.2.1 TDE	)	]			
RMC CORESET	Config 1,4			CR.1.1 FD					
Reference Channel	Config 2,5		C	CR.1.1 TD	D		CCR.3.1 TE	DD	
	Config 3,6		C	CR.2.1 TD					
OCNG Patterns					P.1				
SMTC configuration					TC.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		DD		
	Config 3,6			TRS.1.2 TDD					
SSB configuration	Config 1,2,4,5			SSB.1 FR		SSB.1 FR2			
	Config 3,6			SSB.2 FR1		002.11102			

PDSCH/PDCCH subcarrier spacing	Config 1,2,4,5 Config 3,6	kHz	15 kHz 30 kHz		120 kHz	
CSI-RS configuration	Config 1~6		NA NA	NA	CSI-RS.3.1 TDD Note 5	
reportConfigType	Config 1~6		periodic		NA	
reportQuantity	Config 1~6		cri-RI-PMI-CQI		NA	
CSI reporting periodicity Note 6	Config 1~6	slot	40		NA	
CSI reporting offset	Config 1~6	slot	4	NA		
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMR	S to SSS					
EPRE ratio of PBCH to PB						
EPRE ratio of PDCCH DM						
EPRE ratio of PDCCH to P		dB	0			
EPRE ratio of PDSCH DM						
EPRE ratio of PDSCH to P	EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OC	CNG DMRS (Note 1)					
Propagation condition		-	N/A Link only, see clause A.3.7A		AWGN	

Note 2: Void Note 3: Void

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T<sub>L1-RSRP</sub> during T2.

Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.

Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit	Cell 2			Cell 3			
		Unit	T1	T2	T3	T1	T2	T3	
Angle of arrival co			NA			Setup 1 according to clause A.3.15.1			
Assumption for U	JE beams <sup>Note 7</sup>			NA			Rough		
$N_{oc}$ Note1		dBm/15kHz				-104.7			
$N_{oc}$ Note1	Config 1,2,4,5 Config 3,6	dBm/SCS				-95.7			
SSB_RPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3	link (	only, see c	lause	-∞	-88.7	-88.7	
$\hat{E}_s/N_{oc}$	Config 1,2,3,4,5,6	dB	LIIIK	A.3.7A	iausc	-∞	7	7	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	_∞			-∞	7	7	
IoNote2, Note 4	Config 1,2,4,5	dBm/95.04				-66.68	-58.92	-58.92	
10	Config 3,6	MHz				-00.00	-50.52	-50.92	

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: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

### A.5.5.3.5.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PSCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot ( $m+T_{L1-RSRP}$ ), where  $T_{L1-RSRP}$  is no larger than

$$3ms + T_{FirstSSB\_MAX} + 15*T_{SMTC\_MAX} + 8*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report}$$

as defined in clause 8.3.2. For this test case,  $T_{FirstSSB\_MAX} = T_{SMTC\_MAX} = T_{rs} = 20ms$ ;  $T_{L1-RSRP, measure} = 480ms$  and  $T_{L1-RSRP, measure} = 5ms$ , which allows  $T_{L1-RSRP}$  1000ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot  $m + \frac{T_{HARQ} + T_{activtion\_time} + T_{CSI\_Reporting}}{NR \, slot \, len \, gth}$ , where

- T<sub>HARO</sub> is defined in Table A.5.5.3.1.1-2
- $-T_{activation\_time} = 3ms + T_{FirstSSB\_MAX} + 15*T_{SMTC\_MAX} + 8*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report} + max \; \{(T_{HARQ} + T_{uncertainty\_MAC} + 5ms + T_{FineTiming}), \; \{T_{uncertainty\_RRC} + T_{RRC\_delay}\}, \; which \; allows \; 1030ms \; \{T_{uncertainty\_RRC} + T_{uncertainty\_RRC}\}, \; T_{uncertainty\_RRC} + T_{u$
- $T_{CSI\_Reporting} = 10ms$
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot  $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot  $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$  to  $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}$ , and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe  $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$  to subframe  $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}$ , as defined in clause 8.3, where  $T_{\rm X}=20\,{\rm ms}$ , and  $m_1$  and  $m_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n +  $1 + \frac{T_{\text{HARQ}}}{NR \, slot \, length}$  to n +  $1 + \frac{T_{\text{HARQ}} + 3\, \text{ms}}{NR \, slot \, length}$ , as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe  $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, subframe \, length}$  to subframe  $n_2 + 1 + \frac{T_{\text{HARQ}} + 3\, \text{ms}}{EUTRA \, subframe \, length}$ , where  $n_1$  and  $n_2$  are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The interruption of PSCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 8.2.1.2.10.

The interruption of PCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 7.32.2.5 of TS 36.133 [50].

## 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<sub>0</sub> configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candicate set q<sub>1</sub>. 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.5.5.5.1.1-2 shows the variation of the downlink L1-RSRP 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 5 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 1.

Table A.5.5.5.1.1-1: Supported test configurations for FR2 PSCell

Confi	guration	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			
	3	LTE FDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
	4	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW <sub>channel</sub>	1-4	MHz	100: $N_{RB,c} = 66$	
Data RBs allocated	1-4		66	
PDSCH/PDCCH subcarrier spacing	1-4	kHz	120	
DL initial BWP configuration	1-4		DLBWP.0.1	
DL dedicated BWP configuration	1-4		DLBWP.1.1	
UL initial BWP configuration	1-4		ULBWP.0.1	

			_		T
UL dedicated BWP co		1-4		ULBWP.1.1	
PDSCH Reference Ch	nannel	1-2		SR.3.2 TDD	
PMOLOOPEOET D. (cm. C'		3-4		SR.3.3 TDD	
RMSI CORESET Refe	erence Channel	1-2		CR.3.1 TDD	
		3-4		CR.3.2 TDD	
Dedicated CORESET	Reference Channel	1-2		CCR.3.1 TDD	
		3-4		CCR.3.7 TDD	
OCNG parameters		1-4		OP.1	
CP length		1-4		Normal	
PDSCH/PDCCH TCI s	state	1-4		TCI.State.0	
CSI-RS for tracking		1-4		TRS.2.1 TDD	
SSB Configuration		1-2		SSB.1 FR2	
		3-4		SSB.2 FR2	
SMTC Configuration		1-4		SMTC.3	
PRACH Configuration		1-4		FR2 PRACH	A.3.8.3.2
		1-4		configuration 2	A.3.0.3.2
DRX configuration		1-4		OFF	
SSB index assigned a		1-4		0	
SSB index assigned a		1-4		1	
SSB index assigned a	s RLM RS	1-4		0,1	
Beam failure	DCI format	1-4		1-0	
detection	Number of Control	1-4		2	
transmission	OFDM symbols	1-4		2	
parameters	Aggregation level	1-4	CCE	8	
	Ratio of hypothetical				
	PDCCH RE energy to	1-4	dB	0	
	average SSS RE energy				
	Ratio of hypothetical				
	PDCCH DMRS energy	1-4	dB	0	
	to average SSS RE			0	
	energy				
	DMRS precoder	1-4		REG bundle	
	granularity			size	
	REG bundle size	1-4		6	
Gap pattern ID		1-4		gp0	
gapOffset		1-4	ms	0	
rlmInSyncOutOfSync7	Threshold	1-4		absent	Value 0 is applied.
				abscrit	(Table 8.1.1-1).
rsrp-ThresholdSSB		1-2		-95	Threshold used for
			dBm/SCS		Qin_LR_SSB
		3-4		-92	Qin_LR_SSB
powerControlOffsetSS	3				Used for deriving
		1-4		db0	rsrp-ThresholdCSI-
					RS
beamFailureInstanceN	MaxCount	1 1		n1	see TS 38.321 [7],
		1-4		n1	clause 5.17
beamFailureDetection	Timer	1-4		nhfd/l	see TS 38.321 [7],
		1 -4		pbfd4	clause 5.17
CSI-RS configuration	for CSI reporting	1-4		CSI-RS.3.1	
		1 -4		TDD	
reportConfigType		1-4		periodic	
reportQuantity		1-4		cri-RI-PMI-CQI	
CSI reporting periodicity		1-4	slot	40	
CSI reporting offset		1-4	slot	4	
T310		1-4	ms	1000	
N310		1-4		2	
T1					The UE shall be fully
		1-4	s	1	synchronized to cell 1
					during T1
T2		1-4	S	2.61	

T3		1-4	S	1.64			
T4		1-4	S	0			
T5		1-4	S	1.01			
D1		1-4	S	0.97			
Note 1:	Note 1: All configurations are assigned to the UE prior to the start of time period T1.						
Note 2:	2: UE-specific PDCCH is not transmitted after T1 starts.						

Table A.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup 1	defined in A.	3.15	
Assumption for UE be	eams <sup>Note 10</sup>			•	Rough		
EPRE ratio of PDCCI	H DMRS to	dB			0		
EPRE ratio of PDCCI	H to PDCCH	dB					
EPRE ratio of PBCH SSS	DMRS to	dB					
EPRE ratio of PBCH DMRS	EPRE ratio of PBCH to PBCH						
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCI	H to PDSCH	dB					
EPRE ratio of OCNG SSS	DMRS to	dB					
EPRE ratio of OCNG DMRS	to OCNG	dB					
SNR_SSB of set q <sub>0</sub>	Config 1-4	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-4	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1-2	dBm/SCS	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 3-4		-101.5	-101.5	-81.5	-81.5	-81.5
$N_{oc}$	Config 1-4	dBm/120 KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

#### Table A.5.5.5.1.1-4: Void

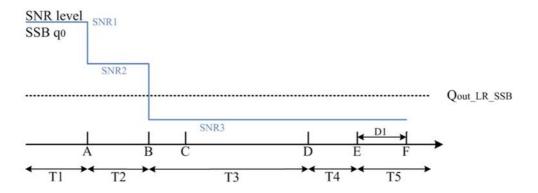


Figure A.5.5.5.1.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

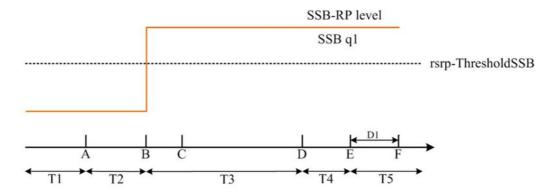


Figure A.5.5.5.1.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

## 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.5.5.5.2.1-2 shows the variation of the downlink L1-RSRP 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 5 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					
3	LTE FDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
4	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.5.2.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW <sub>channel</sub>	1-4	MHz	100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1-4		66	
PDSCH/PDCCH subcarrier spacing	1-4	kHz	120	
DL initial BWP configuration	1-4		DLBWP.0.1	

DI dadicated DMD as	nfiguration	4.4	1	DI DWD4 4	
DL dedicated BWP co		1-4		DLBWP.1.1	
UL initial BWP configu		1-4 1-4		ULBWP.0.1 ULBWP.1.1	
UL dedicated BWP co					
PDSCH Reference Ch	iannei	1-2 3-4	-	SR.3.2 TDD	
DMCLCODECET Data	RMSI CORESET Reference Channel			SR.3.3 TDD	
RIVISI CORESET Rele	erence Channel	1-2 3-4	-	CR.3.1 TDD CR.3.2 TDD	
Dadissand CODECET	Dedicated CORESET Reference Channel				
Dedicated CORESET	Reference Channel	1-2 3-4	-	CCR.3.1 TDD CCR.3.7 TDD	
OCNG parameters		1-4		OP.1	
CP length		1-4		Normal	
PDSCH/PDCCH TCI s	etato	1-4		TCI.State.0	
CSI-RS for tracking	state	1-4		TRS.2.1 TDD	
SSB Configuration		1-4		SSB.1 FR2	
33B Configuration		3-4	+	SSB.2 FR2	
SMTC Configuration		1-4		SMTC.3	
PRACH Configuration		1-4		FR2 PRACH	
FRACH Configuration		1-4		configuration 2	A.3.8.3.2
DRX configuration		1-4		DRX.3	A.3.3.3
SSB index assigned a	s BFD RS (g <sub>o</sub> )	1-4		0	71.0.0.0
SSB index assigned a		1-4	1	1	
SSB index assigned a		1-4		0,1	
Beam failure	DCI format	1-4		1-0	
detection	Number of Control	1-4			
transmission	OFDM symbols	1-4		2	
parameters	Aggregation level	1-4	CCE	8	
parameters	Ratio of hypothetical		002		
	PDCCH RE energy to	1-4	dB	0	
	average SSS RE energy			· ·	
	Ratio of hypothetical		.ID		
	PDCCH DMRS energy	1-4		0	
	to average SSS RE	1-4	dB	U	
	energy				
	DMRS precoder	1-4		REG bundle	
	granularity	1-4		size	
	REG bundle size	1-4		6	
Gap pattern ID		1-4		N/A	
rlmInSyncOutOfSyncT	hreshold	1-4		absent	Value 0 is applied.
TI   1000					(Table 8.1.1-1).
rsrp-ThresholdSSB		1-2		-95	Threshold used for
		3-4	dBm/SCS	00	Qin LR SSB
		3-4		-92	
powerControlOffsetSS	i				Used for deriving
		1-4		db0	rsrp-ThresholdCSI-
					RS
beamFailureInstanceN	/laxCount	1-4		n1	see TS 38.321 [7],
	-				clause 5.17
beamFailureDetection	limer	1-4		pbfd4	see TS 38.321 [7],
001.00 " "	(a. 00)	-	-	-	clause 5.17
CSI-RS configuration for CSI reporting		1-4		CSI-RS.3.1	
war and Counting True		4 4	1	TDD	
reportConfigType		1-4	<del> </del>	periodic	
reportQuantity		1-4	ala/	cri-RI-PMI-CQI	
CSI reporting periodicity		1-4	slot	40	
CSI reporting offset		1-4	slot	-	
T310		1-4	ms	1000	
N310		1-4	-	2	The HE shall be fully
T1		1-4		1	The UE shall be fully synchronized to cell 1
		1-4	S	'	during T1
L		l	I .		I duling I I

T2	1-4	S	3.37			
T3	1-4	S	2.8			
T4	1-4	S	0			
T5	1-4	S	0.61			
D1	1-4	S	0.57			
Note 1: UE-specific PDCCH is not transmitted after 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

Parameter Uni					Test 1		
			T1	T2	Т3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beam	S <sup>Note 10</sup>		Rough				
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
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	EPRE ratio of PSS to SSS						
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 <sub>0</sub>	Config 1-4	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-4	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1-2	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 3-4	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
$N_{oc}$	Config 1-4	dBm/120			-104.7		
1 voc		KHz					
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The 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: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.2.1-4: Void

Table A.5.5.5.2.1-5: Void

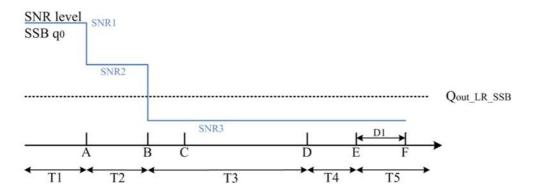


Figure A.5.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in DRX mode

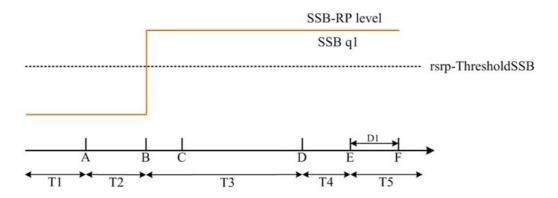


Figure A.5.5.5.2.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in DRX mode

## 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<sub>0</sub> configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q<sub>1</sub>. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set  $q_0$  in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.3.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled.

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
2	LTE TDD, 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

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-2		Cell 1	
E-UTRA RF Channel Number	1-2		1	
Active PCell	1-2		Cell 2	
RF Channel Number	1-2		2	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW <sub>channel</sub>	1-2		100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	
PDSCH Reference Channel	1-2		SR.3.2 TDD	
RMSI CORESET Reference Channel	1-2		CR.3.1 TDD	
Dedicated CORESET Reference Channel	1-2		CCR.3.1 TDD	
OCNG parameters	1-2		OP.1	
CP length	1-2		Normal	
PDSCH/PDCCH TCI state	1-2	•	TCI.State.0	
CSI-RS for tracking	1-2		TRS.2.1 TDD	

00D 0 (' ('		4.0	T	00D 4 ED0	T
SSB Configuration		1-2		SSB.1 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration	l	1-2		FR2 PRACH	A.3.8.3.4
				configuration 4	
DRX configuration		1-2		OFF	
CSI-RS configuration	for BFD/CBD/RLM	1-2		CSI-RS.3.2	A.3.14.2
				TDD	7
CSI-RS index assigned		1-2		0	
CSI-RS index assigned		1-2		1	
CSI-RS index assigned		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control	1-2		2	
transmission	OFDM symbols				
parameters	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical				
	PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy				
	Ratio of hypothetical				
	PDCCH DMRS energy	1-2	dB	0	
	to average SSS RE		GD.	Ü	
	energy				
	DMRS precoder	1-2		REG bundle	
	granularity			size	
	REG bundle size	1-2		6	
Gap pattern ID		1-2		N/A	
rlmInSyncOutOfSync <sup>-</sup>	Threshold	1-2		absent	Value 0 is applied.
rorn ThrooboldCCD					(Table 8.1.1-1). Threshold used for
rsrp-ThresholdSSB		1-2	dBm/SCS	-95	Q <sub>in_LR_SSB</sub>
powerControlOffsetSS					Used for deriving
powercontrolonsetoc	,	1-2		db0	rsrp-ThresholdCSI-
		1-2		abo	RS
beamFailureInstanceI	MaxCount				see TS 38.321 [7],
Deamrailuremstancei	viaxCount	1-2		n1	clause 5.17
beamFailureDetection	Timor				see TS 38.321 [7],
DeamrailureDetection	riller	1-2		pbfd4	see   13   36.321   [7],   clause 5.17
CSI-RS configuration	for CSI reporting			CSI-RS.3.1	
Col-No collingulation	ioi ooi reporting	1-2		TDD	A.3.14.2
reportConfigType		1-2		periodic	
reportQuantity		1-2	<del> </del>	cri-RI-PMI-CQI	
CSI reporting periodic	ity	1-2	slot	40	
CSI reporting periodic	nty	1-2	slot	40	
T0.40		1-2	1	1000	
N310	1310 N210		ms	2	
T1		1-2			The UE shall be fully
		1-2	s	1	synchronized to cell 1
		1-2	3	'	during T1
T2		1-2	S	1.17	adiling i i
T3		1-2	S	0.9	
T4		1-2	S	0.9	
T5		1-2	S	0.31	
D1		1-2	S	0.27	
	PDCCH is not transmitted a			0.21	l
Note 1: UE-specific PDCCH is not transmitted after T1 starts.					

Table A.5.5.5.3.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1

Ī			T1	T2	Т3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams	Note 10			•	Rough		
EPRE ratio of PDCCH DN	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q <sub>0</sub>	Config 1-2	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q <sub>1</sub>	Config 1-2	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS					
$N_{oc}$	Config 1-2	dBm/12			-104.7		·
1 oc		0 KHz					
Propagation condition				TDI	A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- 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 REs carrying CSI-RS.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 clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.3.1-4: Void

Table A.5.5.5.3.1-5: Void

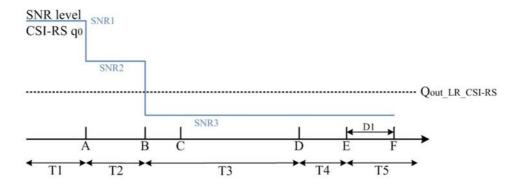


Figure A.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

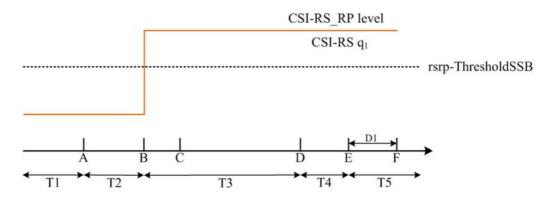


Figure A.5.5.5.3.1-2: CSI-RS\_RP level variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

# 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 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.5.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in DRX mode

# A.5.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set  $q_0$  configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set  $q_1$ . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set  $q_0$  in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-2 shows the variation of the downlink L1-RSRP 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 5 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
2	LTE TDD, FDD 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	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-2		Cell 1	
E-UTRA RF Channel Number	1-2		1	
Active PCell	1-2		Cell 2	
RF Channel Number	1-2		2	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW <sub>channel</sub>	1-2		100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	

DD00115 ( 5:		1.0	1	00 0 0 700	T
PDSCH Reference Ch		1-2		SR.3.2 TDD	
RMSI CORESET Refe		1-2		CR.3.1 TDD	
Dedicated CORESET	Reference Channel	1-2		CCR.3.1 TDD	
OCNG parameters		1-2		OP.1	
CP length		1-2		Normal	
PDSCH/PDCCH TCI s	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1-2		SSB.1 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration		1-2		FR2 PRACH	A.3.8.3.4
				configuration 4	A.3.6.3.4
DRX configuration		1-2		DRX.3	A.3.3.3
CSI-RS configuration	for BFD/CBD/RLM	1-2		CSI-RS.3.2	A.3.14.2
		1-2		TDD	A.3.14.2
CSI-RS index assigne	d as BFD RS (q <sub>0</sub> )	1-2		0	
CSI-RS index assigne		1-2		1	
CSI-RS index assigne		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control				
transmission	OFDM symbols	1-2		2	
parameters	Aggregation level	1-2	CCE	8	
1	Ratio of hypothetical		002		
	PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy	' -	QD.	O	
	Ratio of hypothetical				
	PDCCH DMRS energy				
	to average SSS RE	1-2	dB	0	
	energy DMRS precoder			REG bundle	
	granularity	1-2		size	
	REG bundle size	1-2		6	
Gap pattern ID	REG buildle size	1-2		N/A	
rlmInSyncOutOfSyncT	hrashald	1-2		IN/A	Value 0 is applied.
Ilminayncoulolaynci	nresnoia	1-2		absent	
warma Thura ah aldCCD					(Table 8.1.1-1).
rsrp-ThresholdSSB		1-2	dBm/SCS	-95	Threshold used for
					Qin_LR_SSB
powerControlOffsetSS	•	4.0		مالہ ٥	Used for deriving
		1-2		db0	rsrp-ThresholdCSI-
to a configuration of the second	1		-		RS TO 00 004 [7]
beamFailureInstanceN	viaxCount	1-2		n1	see TS 38.321 [7],
		. –	1	1	clause 5.17
beamFailureDetectionTimer			1		TC
beamFailureDetection	Timer	1-2		pbfd4	see TS 38.321 [7],
		1-2		pbfd4	see TS 38.321 [7], clause 5.17
beamFailureDetection  CSI-RS configuration				CSI-RS.3.1	clause 5.17
CSI-RS configuration		1-2		CSI-RS.3.1 TDD	
CSI-RS configuration reportConfigType		1-2 1-2		CSI-RS.3.1 TDD periodic	clause 5.17
CSI-RS configuration reportConfigType reportQuantity	for CSI reporting	1-2 1-2 1-2		CSI-RS.3.1 TDD	clause 5.17
CSI-RS configuration reportConfigType	for CSI reporting	1-2 1-2	slot	CSI-RS.3.1 TDD periodic	clause 5.17
CSI-RS configuration reportConfigType reportQuantity	for CSI reporting	1-2 1-2 1-2	slot slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic	for CSI reporting	1-2 1-2 1-2 1-2		CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset	for CSI reporting	1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4	clause 5.17
reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	clause 5.17  A.3.14.2  The UE shall be fully
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	clause 5.17  A.3.14.2  The UE shall be fully
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1  T2 T3	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1  T2 T3 T4	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1  T2 T3 T4 T5	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0 0.31	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1  T2 T3 T4 T5 D1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0	Clause 5.17  A.3.14.2  The UE shall be fully synchronized to cell 1

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

Paramete	Unit	Test 1					
			T1	T2	T3	T4	T5
AoA setup				Setup 1	1 defined in	A.3.15	
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DM	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	RS to SSS	dB					
EPRE ratio of PBCH to PE	RE ratio of PBCH to PBCH DMRS dB						
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q <sub>0</sub>	Config 1-2	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q <sub>1</sub>	Config 1-2	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS					
$N_{oc}$	Config 1-2	dBm/12	-104.7				
1 voc		0 KHz					
Propagation condition	·			TDI	L-A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- 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 REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

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

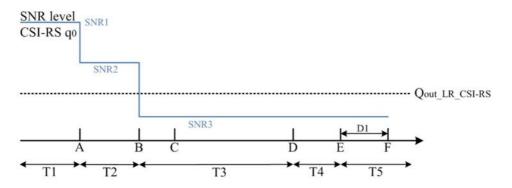


Figure A.5.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

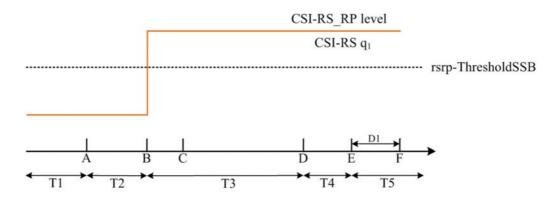


Figure A.5.5.5.4.1-2: CSI-RS\_RP level variation for CSI-RS based beam failure detection and link recovery testing in DRX mode

# 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 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<sub>1</sub>.

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.5.5.5.5.1-1 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.5.5.5.5.1-2 shows the variation of the downlink L1-RSRP 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 5ms. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.5.5.5.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE 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	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW <sub>channel</sub>	1-4		100: N <sub>RB,c</sub> = 66	

Data RBs allocated		1-4	T	66	
PDSCH/PDCCH subc	orrior angoing	1-4	kHz	120	
DL initial BWP configu		1-4	KIZ	DLBWP.0.1	
DL dedicated BWP co		1-4		DLBWP.1.1	
UL initial BWP configu		1-4		ULBWP.0.1	
		1-4		ULBWP.1.1	
UL dedicated BWP configuration PDSCH Reference Channel		1-2		SR.3.2 TDD	
r Doci i Nelelelice Ci	laillei	3-4	+	SR.3.3 TDD	
RMSI CORESET Refe	vrence Channel	1-2		CR.3.1 TDD	
INVISIONESET NEIG	erence Charmer	3-4	+	CR.3.1 TDD	
Dedicated CORESET	Reference Channel	1-2		CCR.3.1 TDD	
Dedicated CONLOCT	Reference Charmer	3-4	+	CCR.3.7 TDD	
OCNG parameters		1-4		OP.1	
CP length		1-4		Normal	
PDSCH/PDCCH TCI s	state	1-4		TCI.State.0	
CSI-RS for tracking	nato	1-4		TRS.2.1 TDD	
SSB Configuration		1-2		SSB.1 FR2	
COD Comigaration		3-4	†	SSB.2 FR2	
SMTC Configuration		1-4		SMTC.1	
PRACH Configuration				FR2 PRACH	
1 TO COLL COLLINGUICATION		1-4		configuration 2	A.3.8.3.2
DRX configuration		1-4		OFF	
SSB index assigned a	s BED RS (g <sub>0</sub> )	1-4		0	
SSB index assigned a		1-4		1	
Beam failure	DCI format	1-4		1-0	
detection	Number of Control	1-4		1-0	
transmission	OFDM symbols	1-4		2	
parameters	Aggregation level	1-4	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1-4	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-4	dB	0	
	DMRS precoder granularity	1-4		REG bundle size	
	REG bundle size	1-4		6	
Gap pattern ID		1-4		N/A	No measurement gap is configured
rlmlnSyncOutOfSyncT	hreshold	1-4		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1-2		-95	Thursday I do not do not be a
		3-4	dBm/SCS	-92	Threshold used for Q <sub>in_LR_SSB</sub>
powerControlOffsetSS		1-4		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount		1-4		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer		1-4		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	for CSI reporting	1-4		CSI-RS.3.1 TDD	
reportConfigType		1-4		periodic	
reportQuantity		1-4		cri-RI-PMI-CQI	
CSI reporting periodic	ity	1-4	slot	40	
CSI reporting offset	-	1-4	slot	4	
T310		1-4	ms	1000	
N310		1-4		2	
·			•		

T1	1-4	S	1	The UE shall be fully synchronized to cell 1 during T1
T2	1-4	S	2.6	
T3	1-4	S	1.64	
T4	1-4	S	0	
T5	1-4	S	1.01	
D1	1-4	S	0.97	
Note 1: All configurations are assigned to the L	IE prior to	the start of tir	ne period T1	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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

Paramete	Unit			Test 1			
			T1	T2	Т3	T4	T5
AoA setup				Setup '	defined in	A.3.15	
Assumption for UE beam	S <sup>Note 10</sup>				Rough		
EPRE ratio of PDCCH DI	MRS to SSS	dB			0		
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					
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 <sub>0</sub>	Config 1-4	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-4	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1-2	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 3-4	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
$N_{oc}$ Config 1-4		dBm/120			-104.7		
		kHz					
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The 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: Void
- 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.5.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

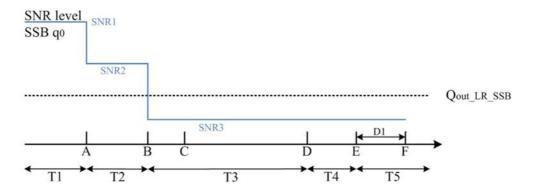


Figure A.5.5.5.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

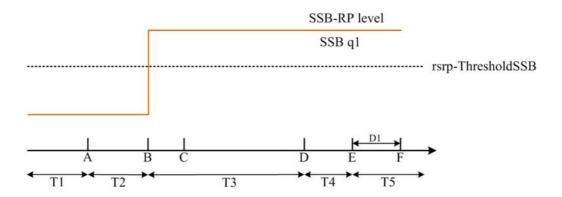


Figure A.5.5.5.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

# 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 clause 8.6. 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 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 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 E-UTRA 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 (E-UTRA 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 on the first DL slot that occurs after the beginning of PSCell's DL slot  $(i+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than the first UL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay})$ .

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 first slot of the half 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 on the first DL slot that occurs after the beginning of PSCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay})$ .

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/NACK is received.

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 fulfil	s the requirements in test case A.5.5.2.2 can skip the test cases in A.5.5.2.1.

Table A.5.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	O	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
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 <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD

RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS	]	
EPRE ratio of PDCCH DMRS to SSS	]	
EPRE ratio of PDCCH to PDCCH DMRS	]	
EPRE ratio of PDSCH DMRS to SSS	]	
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note	]	
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.1.1.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

	Parameter	Unit	Cell 2				
Angle of arrival configuration			Setup 1 according to clause				
			A.3.15.1				
	on for UE beams <sup>Note 6</sup>		Fine				
N <sub>oc</sub> Note 1		dBm/15	-112				
		kHz					
N <sub>oc</sub> Note 1		dBm/SCS	-103				
SS-RSRI	Note 2	dBm/120	-85				
		kHz Note3					
Ês/Iot		dB	18				
Io <sup>Note2</sup>		dBm/95.04	-55.94				
		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						
Note 2:	SS-RSRP and lo levels have beer		•				
	information purposes. They are no	ot settable para	ameters themselves.				
Note 3:	SS-RSRP minimum requirements		ŭ i				
	interference and noise at each receiver antenna port.						
Note 4:	= q=···=······ p - ···- · · · · · · · · · · · ·						
	quiet zone						
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone.						
Note 6:	Information about types of UE bea	•	3.2.1.3, and does not limit UE				
	implementation or test system imp	lementation					

#### A.5.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelav}+k1)$ .

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k1)$ .

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration  $T_{BWPswitchDelay}$  defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of 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/NACK.

# A.5.5.6.1.2 E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in synchronous EN-DC

#### A.5.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.2, and interruption requirements for NR victim cell defined in clause 8.2.1.2. 7. 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 PSCell (Cell 2) and one 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 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 E-UTRA 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) and SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA 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 SCell, BWP-1 and BWP-2, in Cell 3 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 PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PSCell.

- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell'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 on the first DL slot that occurs after the beginning of SCell's DL slot  $(i+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than the first UL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay}+k_1)$ . The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay})$ .

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

#### During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after 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 on the first DL slot that occurs after the beginning of SCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell at latest on the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+k_1)$ . The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay})$ .

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of SCell.

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 required to be tested in one of the supported test configurations				
Note 2:	A UE which fulfils the requirements in test case A.5.5.6.1.2 can skip the test cases in A.5.5.6.1.1.				
Note 3:	NR configuration	is the same for PSCell and SCells.			

Table A.5.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		1	test

NR RF Channel Number		2, 3	Two NR radio channels are 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 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.
Cell-individual offset for cells on RF channel number 3	dB	0	Individual offset for cells on SCC.
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		FR2		
Duplex mode		TDD		
TDD configuration		TDDC	onf.3.1	
BW <sub>channel</sub>		100 MHz:	$N_{RB,c} = 66$	
Active BWP ID		0	1,2	
Initial DL BWP Configuration		DLBWP.0.2	DLBWP.0.2	
Active DL BWP-0 Configuration		DLBWP.0.2	N.A.	
Active DL BWP-1 Configuration		N.A.	DLBWP.1.3	
Active DL BWP-2 Configuration		N.A.	DLBWP.1.1	
Initial UL BWP Configuration		ULBWP.0.2	N.A.	
Active UL BWP-0 Configuration		ULBWP.0.2	N.A.	
Active UL BWP-1 Configuration		N.A.	N.A.	
Active UL BWP-2 Configuration		N.A.	N.A.	
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.S	tate.0	
Antenna Configuration		12	(2	
Propagation Condition		AW	'GN	
EPRE ratio of PSS to SSS	dB	0	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note				
1)				

EPRE rat	tio of OCNG to OCNG DMRS						
(Note 1)							
Note 1:	OCNG shall be used such that bot	th cells are full	y allocated and a constant to	tal transmitted power			
	spectral density is achieved for all	OFDM symbo	ls.				
Note 2:	lote 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over						
	subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.						
Note 3:	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 BWF	is linked with	an UL BWP. DLBWP.0.2 is I	inked with ULBWP.0.2;			
	DLBWP 1.1 is linked with ULBWP 1.1: DLBWP 1.3 is linked with ULBWP 1.3						

Table A.5.5.6.1.2.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3	
Angle of arrival configuration		Setup 1 according to clause A.3.15		
Assumption for UE beamsNote 6		F	ine	
N <sub>oc</sub> Note 1	dBm/15	-112	-112	
	kHz			
SS-RSRP Note 2	dBm/120	-85	-85	
	kHz Note3			
Ê <sub>s</sub> /I <sub>ot</sub>	dB	18	18	
lo <sup>Note2</sup>	dBm/95.04	-55.94	-55.94	
	MHz Note4			

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for 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 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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

### A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k_1)$ .

During T3, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k_1)$ .

Where, k<sub>1</sub> 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 SCell 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 PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell 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 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/NACK in the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k_1)$ ,  $(j+T_{BWPswitchDelay}+k_1)$ , then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

# 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 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 PSCell are specified in Table A.5.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA 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 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

# During T1,

If the *RRCReconfiguration* is embedded in E-UTRA RRC message, time period T1 starts when a E-UTRA RRC message *RRCConnectionReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side from PCell in PSCell's slot # denoted *i*. Otherwise, i.e., if the *RRCReconfiguration* is not embedded in E-UTRA RRC message, time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in from PSCell in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PSCell from the first DL slot occurs right after the beginning of PSCell's DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$  as defined in clause 8.6.3 and starts

to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1..$  The UE shall be continuously scheduled on PSCell's

BWP-1 starting from the first DL slot that occurs right after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}$ 

NR Slot length

 $T_{RRCprocessingDelay}$  and  $T_{BWPswitchDelayRRC}$  are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK 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 requ	uired to be tested in one of the supported test configurations

Table A.5.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		ı	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	

Table A.5.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode			TDD
TDD configuration			TDDConf.3.1
BW <sub>channel</sub>			100 MHz: N <sub>RB,c</sub> = 66
Active BWP ID			1, 2
Initial DL BWP Configuration			DLBWP.0.2
Initial UL BWP Con	figuration		ULBWP.0.2
Initial Condition	Active DL BWP-1 Configuration		DLBWP.1.3
Active UL BWP-1 Configuration			ULBWP.1.3
Final	Active DL BWP-1 Configuration		DLBWP.1.1

			Т			
Condition		Active UL BWP-1		ULBWP.1.1		
		Configuration				
PDSCH Reference measurement channel				SR.3.1 TDD		
RMSI CORESET parameters				CR.3.1 TDD		
Dedicated	d CORESET	parameters		CCR.3.1 TDD		
OCNG Pa	atterns			OP.1		
SSB Con	figuration			SSB.1 FR2		
SMTC Co	onfiguration			SMTC.1		
TCI State	!			TCI.State.0		
TRS Con	figuration			TRS.2.1 TDD		
Antenna (	Configuration	า		1x2		
	Propagation Condition			AWGN		
EPRE ratio of PSS to SSS			dB	0		
EPRE ratio of PBCH DMRS to SSS		IRS to SSS				
EPRE ratio	of PBCH to F	PBCH DMRS				
	EPRE ratio of PDCCH DMRS to SSS					
		PDCCH DMRS				
	of PDSCH D					
	of PDSCH to					
		MRS to SSS(Note 1)				
		OCNG DMRS (Note 1)				
Note 1:	OCNG sha	Il be used such that bo	th cells are full	y allocated and a constant		
	total transn	nitted power spectral de	ensity is achiev	ed for all OFDM symbols.		
Note 2:	Interferenc	e from other cells and r	noise sources r	not specified in the test is		
assumed to be constant over subcarriers an			carriers and tim	ne 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				other parameters for		
information purposes. They are not settable parameters themselves.						
Note 4:	· · · · · · · · · · · · · · · · · · ·					
		th ULBWP.0.2; DLBWF				
		•		•		
	DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of					

Table A.5.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

TS 38.213 [3].

Parameter		Unit	Cell 2	
Angle of arrival configuration			Setup 1 according to A.3.15	
Assumption for UE be	eams <sup>Note 5</sup>		Fine	
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz	-112	
	NR_TDD_FR2_G	UDIII/ IOKIIZ	-112	
	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	-103	
	NR_TDD_FR2_G	ubiii/303	-103	
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_B	dBm/SCS		
	NR_TDD_FR2_F	Note3	-85	
	NR_TDD_FR2_G			
	NR_TDD_FR2_T			

		NR_TDD_FR2_Y			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	18	
		NR_TDD_FR2_A			
		NR_TDD_FR2_B			
Io <sup>Note2</sup>		NR_TDD_FR2_F	dBm/95.04	-55.94	
10		NR_TDD_FR2_G	MHz Note4	-55.94	
	NR_TDD_FR2_T				
		NR_TDD_FR2_Y			
Note 1:	te 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 bee	n derived from o	ther parameters for	
	information	n purposes. They are n	ot settable parar	neters themselves.	
Note 3:	SS-RSRP	minimum requirements	are specified as	ssuming 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:	3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,				
	implement	ation or test system imp	olementation		

### A.5.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell from the first DL slot that occurs right after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$  and starts to report valid ACK/NACK for the

PSCell from the first UL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length} + k1$ .

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

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%.

# 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.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
Note: The UE is on	y required to be tested in one of the supported test configurations

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Pa	rameter	Unit	Value	Comment
RF Channel I	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	dBm	-118	Actual RSRP threshold for event B1. Needs to
	RSRP			take absolute accuracy tolerance in clause
				9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
PRACH conf	guration on cell2		FR2	Captured in A.3.8.3.2
			configuration 2	
Cell-individua RF channel r	al offset for cells on number 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individua RF channel r	al offset for cells on number 2	dB	0	Individual offset for cells on carrier frequency of cell2.
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2		S	1	During this time the UE adds the PSCell.
T3		s	1	During this time the UE sends CSI reports for PSCell.
T4	·	S	1	During this time the UE releases the PSCell.

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test			
Farameter	Onit	Coming	T1	T2	Т3	T4
E-UTRA Channel Number		1,2		1		
NR Channel Number		1.2		2		

Dumlay Mada		4.0	TDD
Duplex Mode		1,2	TDD
TDD configuration		1,2	TDDConf.3.1
BW <sub>channel</sub>	MHz	1,2	100: NRB,c = 66
Data RBs allocated		1,2	48
Initial BWP		1,2	DLBWP.0.1
Configuration		1,2	ULBWP.0.1
Dedicated BWP		1,2	DLBWP.1.1
Configuration		1,2	ULBWP.1.1
TRS Configuration		1	TRS.2.1 TDD
PDSCH/PDCCH TCI		1	TCI.State.2
state		'	101.01410.2
PDSCH Reference		1,2	SR.3.3 TDD
measurement channel		1,2	3N.3.3 TDD
RMSI CORESET		1,2	CR.3.2 TDD
Reference Channel		1,∠	CR.3.2 TDD
Dedicated CORESET		1.2	CCD 2.7 TDD
Reference Channel		1,2	CCR.3.7 TDD
OCNG Patterns		1,2	OP.3
SSB configuration		1,2	SSB.2 FR2
SMTC configuration		1,2	SMTC.2
PDSCH/PDCCH			
subcarrier spacing	kHz	1,2	120
TRS Configuration		1,2	TRS.2.1 TDD
CSI-RS configuration		,	
for CSI reporting		1,2	CSI-RS.3.1 TDD
reportConfigType		1,2	periodic
reportQuantity		1,2	cri-RI-PMI-CQI
CSI reporting			
periodicity	slot	1,2	40
CSI reporting offset	slot	1,2	4
EPRE ratio of PSS to	0101	1,2	T
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	ub	1,4	
DMRS to SSS			
to PDSCH			
EPRE ratio of OCNG			
DMRS to SSS(Note 1)			
EPRE ratio of OCNG			
to OCNG DMRS (Note			
1)		4.0	A14/ON1
Propagation condition		1,2	AWGN

# Table A.5.5.7.1.1-4: OTA related test parameters

Parameter	Unit	Cell 2			
		T1	T2	Т3	T4
Angle of arrival configuration		Set	Setup 2a according to clause A.3.15.2.1		
Assumption for UE beams <sup>Note</sup>			Rough		

Ês Note2		dBm/SCS -∞ -81		-81		
SSB_RP	Note 2, Note 4	dBm/SCS	8	-81		
$\mathbf{\hat{E}}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note 2, Note 7		dB	- 80	4.88		
Io <sup>Note 2, Note 4</sup>		dBm/95.04 MHz	N/A	-56.41		
Note 1:	Void					
Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 3:	3: Void					
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zor						
Note 5:						
Note 6:	6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.					
Note 7:	Note 7: Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed					
	the associated Refse	ens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance				
	of 1dB for UE multi-b	and relaxation factor ΔMBs f	rom TS 38	3.101-2 [19] Table 6.2.1.3-4.		

# A.5.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 582 ms<sup>Note1</sup> into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3.

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

$$T_{config\_PSCell} = T_{RRC\_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell\_DU} + 2ms$$

Where:

 $T_{RRC\_delay} = 20ms$ 

 $T_{processing} = 40 ms$ 

 $T_{search} = 8*3*20 = 480 \text{ ms}$ 

 $T_{\Delta} = 20 ms$ 

 $T_{PSCell\_DU}\!=1\!*\!10\!+\!10\!=\!20\;ms$ 

# A.5.5.8 Active TCI state switch delay

#### A.5.5.8.1 MAC-CE based active TCI state switch

#### A.5.5.8.1.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

#### A.5.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different TCI states for PSCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 2 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.5.5.8.1.1.1-1 and Figure A.5.5.8.1.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. 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 UE is 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. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PSCell on TCI state 0 till n+  $T_{HARQ}$  +3 ms. The test equipment also verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+  $T_{HARQ}$  +3 ms + ( $T_{first-SSB}$  +  $T_{SSB-proc}$ ).

Table A.5.5.8.1.1.1-1: Supported test configurations

Config Description				
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations		

Table A.5.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		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.5.5.8.1.1.1-3: 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 <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 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.3.2 TDD			
RMSI CORESET parameters		CR.3.1 TDD			
Dedicated CORESET parameters		CCR.3.1 TDD			
OCNG Patterns		OP.5			
SSB Configuration		SSB.1 FR2			
SMTC Configuration		SMTC.1			
TCI State 0		TCI.State.2			
TCI State 1		TCI.State.3			
TRS Configuration		TRS.2.1 TDD			
-		TRS.2.2 TDD			
Correlation Matrix and Antenna		1x2 Low			
Configuration					
EPRE ratio of PSS to SSS	dB	0			
EPRE ratio of PBCH DMRS to SSS	ļ				
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)	J				
EPRE ratio of OCNG to OCNG DMRS (Note					
1)					
Propagation Condition		AWGN			
Note 1: OCNG shall be used such that a constant total transmitted power spectral					

Table A.5.5.8.1.1.1-4: OTA related test parameters for TCI state switch

density is achieved for all OFDM symbols.

Parameter	Unit	Cell 2			
		SSB0		SSB1	
		T1	T2	T1	T2
Angle of arrival		Setup 3 according to clause A.3.15.3			A.3.15.3
configuration		AoA1		AoA2	
Assumption for		Rough Rough		ough	
UE beams Note 6					
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6

$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note 7		dB	8.3	8.3	-Infinity	8.3	
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0	
Note 1:	Void						
Note 2:	SSB-RP	and lo levels have been	derived from	n other par	ameters for	information	
	purpose	s. They are not settable p	oarameters t	hemselves	i.		
Note 3:	Void						
Note 4: Equivalent power received by an antenna with 0 dBi gain at t				n at the cen	tre of the		
	quiet zo	ne					
Note 5:		rved with 0dBi gain anter					
Note 6:	Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit					ot limit UE	
	impleme	entation or test system im	plementatio	n.			
Note 7:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value						
	assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-						
	2 [19], and an allowance of 1dB for UE multi-band relaxation factor $\Delta MB_P$ from						
	TS 38.1	01-2 [19] Table 6.2.1.3-4.					

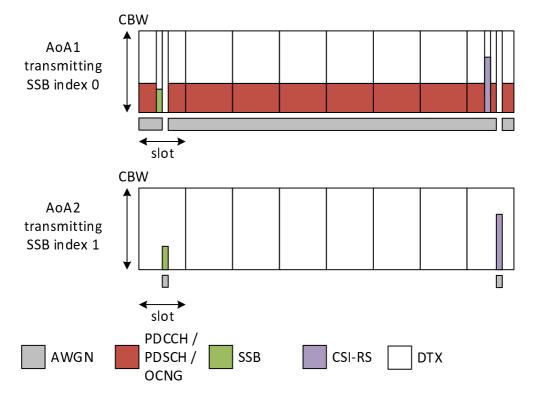


Figure A.5.5.8.1.1.1-1: Time multiplexed downlink transmissions during T1

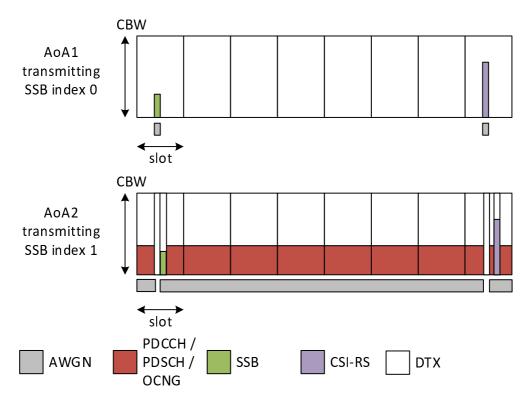


Figure A.5.5.8.1.1.1-2: Time multiplexed downlink transmissions during T2

#### A.5.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till  $n+T_{HARQ}+3 ms$
- be able to start receiving on TCI state 1 after n+ T<sub>HARQ</sub> +5 ms + T<sub>first-SSB</sub>

# A.5.5.8.2 RRC based active TCI state switch

# A.5.5.8.2.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

#### A.5.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 1 TCI state for PSCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. Figure A.5.5.8.2.1.1-1 and Figure A.5.5.8.2.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+  $T_{RRC\_processing} + T_{first-SSB} + 2ms$ .

Table A.5.5.8.2.1.1-1: Supported test configurations

Config		Description				
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only re	equired 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	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 <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 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.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD

OCNG Patterns		OP.5			
SSB Configuration		SSB.1 FR2			
SMTC Configuration		SMTC.1			
TCI State 0		TC. State.2			
TCI State 1		TCI.State.3			
TRS Configuration		TRS.2.1 TDD			
		TRS.2.2 TDD			
reportConfigType		ssb-Index-RSRP			
reportConfigType		periodic			
Number of reported RS		2			
L1-RSRP reporting period	slot	640			
timeRestrictionForChannelMeasurements		configured			
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	1				
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 a constant total transmitted power spectral					

Table A.5.5.8.2.1.1-4: OTA related test parameters for TCI state switch

density is achieved for all OFDM symbols.

Parameter	Unit	Cell 2				
		SSB0		S	SB1	
		T1	T2	T1	T2	
Angle of arrival	Setup 3 according to clause A.:				A.3.15.3	
configuration	onfiguration		<b>A1</b>	AoA2		
Assumption for		Rough		Rough		
UE beams <sup>Note 6</sup>						
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 7	dB	8.3	8.3	-Infinity	8.3	
lo Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0	

Note 1: Void

Note 2: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 7: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor  $\Delta$ MB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

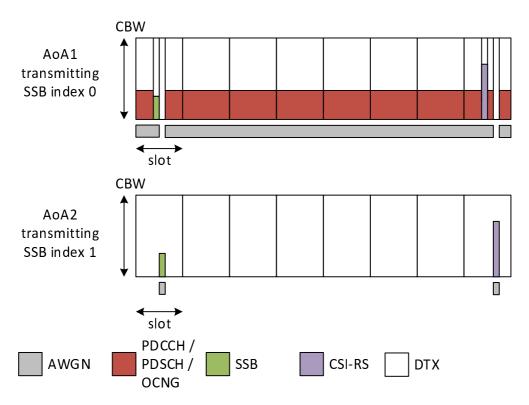
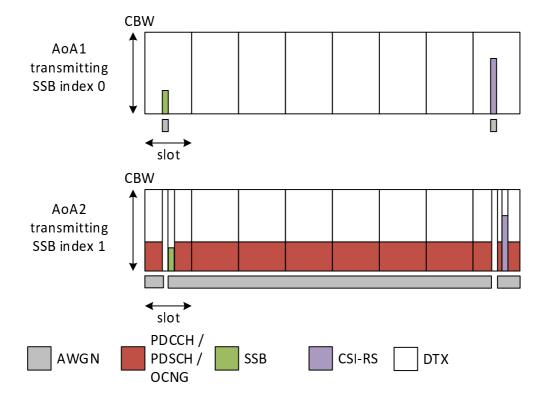


Figure A.5.5.8.2.1.1-1: Time multiplexed downlink transmissions during T1



#### Figure A.5.5.8.2.1.1-2: Time multiplexed downlink transmissions during T2

#### 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

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	equired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.1.1-2, A.5.6.1.1.1-3 and A.5.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.

RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3	One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1	OTRAN Cell.
A3-Offset	dB	1~4	-11	
CP length	GD	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 TDDCon		onf.3.1		
BW <sub>channel</sub>	MHz	1~4	100: N <sub>RB,c</sub> = 66 100: N <sub>RB,c</sub>		в,с = 66		
Data RBs allocated		1,2	24		24		
		3,4	4	48		3	
Intial BWP configuration		1~4	DLBW	DLBWP.0.1 DLBWP		P.0.1	
			ULBW	/P.0.1	ULBW	ULBWP.0.1	
Active DL BWP configuration		1~4	DLBW	/P.1.1	DLBW	P.1.1	
Active UL BWP configuration		1~4	ULBW	/P.1.1	ULBW	P.1.1	
RLM-RS		1~4	SS		SS	B	
PDSCH RMC configuration		1,2	SR.3.2	2 TDD	N/A		
		3,4	SR.3.3	3 TDD			
RMSI CORESET RMC		1,2	CR.3.1	CR.3.1 TDD CR.3.2 TDD		A	
configuration		3,4	CR.3.2			A	
Dedicated CORESET RMC		1,2	CCR.3.1 TDD		N/	A	
configuration		3,4	CCR.3.	7 TDD	N/	A	
PDSCH/PDCCH subcarrier spacing	kHz	1~4	12	20	120		
OCNG Patterns		1~4	OF	P.5	N/	Α	
TRS configuration		1~4	TRS.2.	1 TDD	N/A		
PDSCH/PDCCH TCI state		1~4	TCI.S	tate.2	N/A		
cellIndividualOffset	dB	1~4	N/	Ά	16		
SSB configuration		1, 2	, 2 SSB.3 FR2		SSB.7	FR2	
		3, 4	SSB.4	SSB.4 FR2		FR2	
Propagation Condition		1~4	AW	AWGN		GN	

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	Cell 2		Cell 3	
			T1	T2	T1	T2
AoA setup		1~4	Setup 3 defined in A.3.15.3  AoA1 AoA2		5.3	
					AoA2	
Assumption for UE beams <sup>Note 4</sup>		1~4	Rough		Rough	
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1,2	-64.41	-64.41	-Infinity	-64.41
		3,4	-61.41	-61.41	-Infinity	-61.41
Time multiplexing of the downlink transmissions from each AoA		1~4	Defined in Figure A.5.6.1.1.1-1			1.1-1

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/Iot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

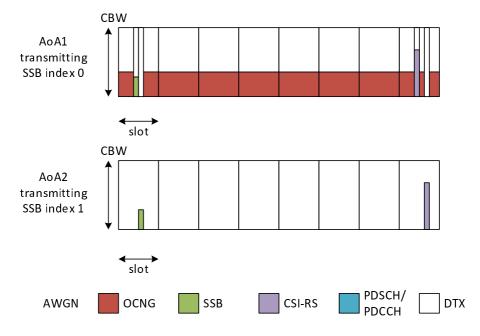


Figure A.5.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

#### A.5.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.1.2 EN-DC event triggered reporting test without gap under DRX

### A.5.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.2.1-1.

Table A.5.6.1.2.1-1: supported test configurations

Configuration	Description				
1	LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3	LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4	LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only 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.

Table A.5.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1 1	E-UTRAN F	PCell (Cell 1)	
		1~4	PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number			1: Cell 1		One TDD carrier frequency is used for the NR
		1~4	2: Cell 2 and Cell 3		cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1		
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	s	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.7	DRX related parameters are defined in Table
		1~4			A.5.6.1.2.1-4
Time offset between		1~4	3 μs		Synchronous EN-DC
Cell 1 and Cell 2		1~4			
Time offset between		1~4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4			
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.2.1-3: 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	
BW <sub>channel</sub>	MHz	1~4	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66	
Data RBs		1~4	66	66	
allocated					
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		1,2	SR.3.2 TDD	N/A	
configuration		3,4	SR.3.3 TDD		
RMSI CORESET		1,2	CR.3.1 TDD	N/A	
RMC		2.4	CR.3.2 TDD	NI/A	
configuration		3,4	CR.3.2 TDD	N/A	
Dedicated		1,2	CCR.3.1 TDD	N/A	
CORESET RMC					
configuration		3,4	CCR.3.7 TDD	N/A	
PDSCH/PDCCH	kHz	1~4	120	120	
subcarrier			0		
spacing					
OCNG Patterns		1~4	OP.1	OP.1	
PDSCH/PDCCH		1~4	TCI.State.2	N/A	
TCI state					
CSI-RS for			TRS.2.1 TDD	N/A	
tracking			TRS.2.1 TDD	N/A	
SSB configuration		1, 2	SSB.3 FR2	SSB.3 FR2	
		3, 4	SSB.4 FR2	SSB.4 FR2	

Propagation	1~4	AWGN	AWGN
Condition			

Table A.5.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Paran	neter	Unit	Config	Cell 2 Cell 3			II 3	
				T1 T2 T1 T			T2	
AoA setu	p		1~4	Setup 1 defined in A.3.15.1				
Assumpti			1~4		Ro	ough		
UE beam	s <sup>Note 4</sup>							
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ B	B Note 5	dB	1~4	3.77	-1.52	-Infinity	-1.52	
$N_{oc}$ Note:	2	dBm/15 KHz	1~4		-	-98		
$N_{oc}$ Note:	2	dBm/SCS	1, 2		-	-89		
			3, 4			-86		
SSB_RP		dBm/SCS	1, 2	-85	-85	-Infinity	-85	
			3, 4	-82	-82	-Infinity	-82	
$\hat{E}_s/N_{oc}$		dB 1~4 4		4	4	-Infinity	4	
Io		dBm/95.04MHz	1~4	-54.53	-52.18	See Cell 2	2 columns	
Note 1:	The reso	ources for uplink transi	mission are assigned	to the UE	orior to the	start of time	period	
Note 2:		nce from other cells a over subcarriers and						
		be fulfilled.			'			
Note 3:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.							
Note 5:	Calculati associat	ion of Es/lotes included ed Refsens requirement outti-band relaxation fa	s the effect of UE inteent in clause 7.3.2 of 1	ΓS 38.101-	<sup>.</sup> [19], and	an allowand		

# 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.5.6.1.3 EN-DC event triggered reporting test with per-UE gaps under non-DRX

### A.5.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.3.1-1.

Table A.5.6.1.3.1-1: supported test configurations

Configuration	Description				
1	LTE FDD, 120 kHz SSB SCS, 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.5.6.1.3.1-2 ~ 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 PCell	
		1~4	(Cell 1)	
			PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number		4 4	1: Cell 1 2: Cell 2 and	One TDD carrier frequency is used for the NR cells
		1~4	Cell 3	and one TDD or FDD carrier frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE gaps	
Measurement gap repitition periodicity	ms	1~4	40	
Measurement gap length	ms	1~4	6	
Measurement gap	ms	4 4	39	
offset		1~4		
SMTC configuration		1~4	SMTC.1	
CSI-RS parameters		1~4	CSI-RS.3.2 TDD resource #0	Resource #1 is not used
A3-Offset	dB	1~4	-11	

CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between Cell 1 and Cell 2		1~4	3 μs	Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs	Synchronous cells
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	C	ell 2	Cell 3		
			T1	T2	T1	T2	
TDD configuration		1~4	TDDC	Conf.3.1	TDDConf.3.1		
BW <sub>channel</sub>	MHz	1~4	100: N	RB,c = 66	100: N	RB,c = 66	
Data RBs allocated		1,2		24	2	24	
		3,4		48	4	l8	
Intial BWP configuration		1~4	DLB\	VP.0.1	DLBV	VP.0.1	
				VP.0.1	_	VP.0.1	
Active DL BWP configuration		1~4	DLB\	WP.1.2	DLBV	VP.1.1	
Active UL BWP configuration		1~4	ULB\	WP.1.2	ULBV	VP.1.1	
RLM-RS		1~4	CS	I-RS	S	SB	
PDSCH RMC configuration		1,2	SR.3	.2 TDD	N	/A	
		3,4	SR.3	.3 TDD	]		
RMSI CORESET RMC		1,2	CR.3	CR.3.1 TDD		N/A	
configuration		3,4	CR.3	.2 TDD	N	/A	
Dedicated CORESET RMC		1,2	CCR.	3.1 TDD	N	/A	
configuration		3,4	CCR.	3.7 TDD	N	/A	
TRS configuration		1~4	TRS.2	2.1 TDD	N	/A	
PDSCH/PDCCH TCI state		1~4	TCI.S	State.2	N	/A	
PDSCH/PDCCH subcarrier	kHz	1~4	1	20	1	20	
spacing							
OCNG Patterns		1~4	0	OP.5 N/A		/A	
cellIndividualOffset	dB	1~4	١	I/A	16		
SSB		1, 2	SSB.3 FR2 SSB.7 FR		7 FR2		
		3, 4	SSB	.4 FR2	SSB.	8 FR2	
Propagation Condition		1~4	AV	VGN	AW	/GN	

Table A.5.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

AoA setup		1~4	Setup 3 defined in A.3.15.3			5.3
			Ao	AoA1		A2
Assumption for UE beams <sup>Note 4</sup>		1~4	Rough		Rough	
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1,2	-64.41	-64.41	-Infinity	-64.41
		3,4	-61.41	-61.41	-Infinity	-61.41
Time multiplexing of the downlink transmissions from each AoA		1~4	Defined in Figure A.5.6.1.3.1-1			3.1-1

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information

purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation

or test system implementation.

Note 5: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

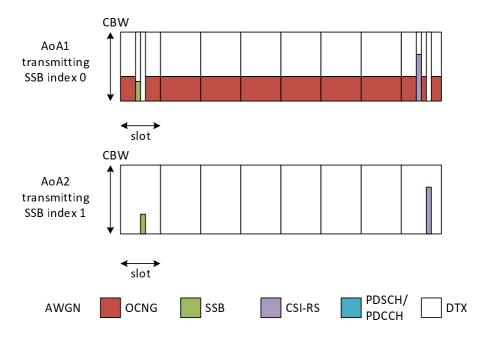


Figure A.5.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

#### 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.5.6.1.4 EN-DC event triggered reporting test with per-UE gaps under DRX

#### A.5.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.4.1-1.

Table A.5.6.1.4.1-1: supported test configurations

Configur	tion 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	JE 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.5.6.1.4.1-2  $\sim$  6.

During the test, Cell 2 and Cell 3 are transmitted from the direction determined according to A3.8.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1~4	E-UTRAN PCell (Cell 1)		
		1~4	PSCell (Cell 2	)	
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel			1: Cell 1		One TDD carrier frequency is used for the
Number		1~4	2: Cell 2 and 0	Cell 3	NR cells and one TDD or FDD carrier
					frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE gaps		
Measurement gap	ms	1~4	40		
repitition periodicity		1~4			
Measurement gap	ms	1~4	6		
length		1~4			
Measurement gap	ms	1~4	39		
offset		1~4			
SMTC configuration		1~4	SMTC.1		
CSI-RS parameters		1~4	CSI-RS.3.2 TI	OD resource #0	Resource #1 is not used
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.7	DRX related parameters are defined in
		1~4			Table A.5.6.1.4.1-5
Time offset between		1~4	3 μs		Synchronous EN-DC
Cell 1 and Cell 2		1~4	· .		
Time offset between		1~4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4	· .		
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 2	Cell 3
			T1 T2	T1 T2
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW <sub>channel</sub>	MHz	1~4	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66
Data RBs		1~4	66	66
allocated				
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		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET RMC		1,2	CR.3.1 TDD	N/A
configuration		3,4	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1,2	CCR.3.1 TDD	N/A
configuration		3,4	CCR.3.7 TDD	N/A
TRS configuration		1~4	TRS.2.1 TDD	N/A

PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
PDSCH/PDCCH subcarrier spacing	kHz	1~4	120	120
OCNG Patterns		1~4	OP.1	OP.1
SSB		1, 2	SSB.3 FR2	SSB.3 FR2
		3, 4	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1~4	AWGN	AWGN

Table A.5.6.1.4.1-4: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	II 2	Cell 3		
		_	T1	T2	T1	T2	
AoA setup		1~4	S	etup 1 defir	ned in A.3.1	5.1	
Assumption for UE beams <sup>Note 4</sup>		1~4	Ro	Rough Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	3.77	-1.52	-Infinity	-1.52	
$N_{oc}^{}$ Note 2	dBm/15 KHz	1~4		-98			
$N_{oc}$ Note 2	dBm/SCS	1, 2		-89			
		3, 4		-86			
SSB_RP	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	1~4	-54.53	-52.18	See Cell 2	2 columns	

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: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/Iot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

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<sub>DCCH</sub> 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	Value	Comment

		Test configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1.	, 2	Two FR2 NR carrier frequencies are 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.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.
T1	S	Config 1,2	5		
T2	S	Config 1,2	5.2 for PC1; 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	Ce	Cell 2		Cell 3
		configuratio n	T1	T2	T1	T2
AoA setup		Config 1,2	Setu	p 3 as specif	ied in claus	e A.3.15
			Ac	A1	/	NoA2
Assumption for UE beams <sup>Note</sup>		Config 1,2	Rough		Rough	
NR RF Channel Number		Config 1,2	1		2	
Duplex mode		Config 1,2	TI	DD	TDD	
BW <sub>channel</sub>	MHz	Config 1,2	100: N	RB,c = 66	100: N <sub>RB,c</sub> = 66	
Data RBs allocated		Config 1,2	6	6	66	
BWP BW	MHz	Config 1,2	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66	
TDD configuration		Config 1,2	TDDConf.3.1		TDDConf.3.1	
Initial DL BWP		Config 1,2	DLBWP.0.1		DLBWP.0.1 NA	

Initial UL BWP		Config 1,2	ULBV	VP.0.1		NA		
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA		
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1	NA			
OCNG Patterns defined in A.3.2.1.1		Config 1,2	0	P.1	OP.1			
TRS configuration		Config 1,2	TRS.2	.1 TDD		NA		
PDSCH/PDCCH TCI state		Config 1,2	TCI.S	State.2		NA		
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-		
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-		
Dedicated CORESET Reference Channel		Config 1,2	CCR.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	120		120			
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS					0			
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2		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) Ês	dBm/S CS	Config 1,2	-87	-87	-Infinity	-87		
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87		
$\hat{E}_{s}/I_{ot}$ BB Note 8	dB	Config 1,2	1.89	1.89	-Infinity	1.89		
Io Note3	dBm/95 .04 MHz <sub>Note5</sub>	Config 1,2	-58.01	-58.01	-Infinity	-58.01		
Propagation Condition		Config 1,2	AV	/GN	AWGN			

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
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
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

### 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<sub>DCCH</sub> 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.

Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell				

Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config 1,2			1		One E-UTRAN TDD carrier
Number							frequenciy is used.
NR RF Channel		Config 1,2		1,	2		Two FR2 NR carrier frequencies
Number							are used.
Active cell		Config 1,2	LTE C	ell 1 (PC	Cell) and	I NR	LTE Cell 1 is on E-UTRA RF
7101170 0011		001111g 1,2		(PScell)	Jon, and		channel number 1.
			00 1	(. 000)			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		Config 1,2	39		39		
offset		001ig 1,2					
SMTC-SSB parameters		Config 1,2	SSB.3	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	1	1		L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between		Config 1,2	3 μs	•	•		Synchronous EN-DC
PCell and PSCell			·				
Time offset between		Config 1,2	3µs				Synchronous cells.
serving and neighbour							
cells							
T1	S	Config 1,2	5	ı	ı	,	
T2	S	Config 1,2	8 for	82	8 for	82	
			PC1;	for	PC1;	for	
			5 for	PC1;	5 for	PC1;	
			othe	52	othe	52	
			r PC	for	r PC	for	
				othe		other	
				r PC		PC	

Table A.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					
AoA setup		Config 1,2	Setup 1 as specif		ied in clause A.3.15		
Assumption for UE beams <sup>Note</sup>		Config 1,2	Ro	Rough		Rough	
NR RF Channel Number		Config 1,2		1		2	
Duplex mode		Config 1,2	ΤI	OD	-	TDD	
BW <sub>channel</sub>	MHz	Config 1,2	100: N	RB,c = 66	100: 1	$N_{RB,c} = 66$	
Data RBs allocated		Config 1,2		6		66	
BWP BW	MHz	Config 1,2		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	DLBV	VP.0.1		NA	
Initial UL BWP		Config 1,2	ULBV	VP.0.1			
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2		P.1	(	OP.1	
TRS configuration		Config 1,2	TRS.2.1 TDD			NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.State.2			NA	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD	-		
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	.1 TDD	-		
SMTC configuration defined in A.3.11		Config 1,2	SM	TC.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			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 <sub>oc</sub> Note2	dBm/15 kHz Note5		-10	)4.7		104.7	

N <sub>oc</sub> Note2	dBm/S CS Note4	Config 1,2	-95.7		-95.7	
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-89.7	-89.7	-Infinity	-86.7
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2	6	6	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1,2	6	6	-Infinity	9
Io <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1,2	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1,2	AWGN AWGN		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: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- 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
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

#### 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

### A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only 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.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		Config 1,2		1	One E-UTRAN TDD carrier
Number					frequency is used.
NR RF Channel Number		Config 1,2	1,	, 2	Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	LTE Cell 1 (Po		LTE Cell 1 is on E-UTRA RF
			cell 2 (PScell)		channel number 1.
					NR Cell 2 is on NR RF channel
N I I		0 " 10	ND II O		number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel
One Battama Id		0 6 - 1 0	0	10	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.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC

Time offset between serving and neighbour cells		Config 1,2	Зµѕ		Synchronous cells.
T1	S	Config 1,2	5		
T2	S	Config 1,2	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		(	Cell 3
		configuratio n	T1	T2	T1	T2
AoA setup		Config 1,2	Setu	p 3 as specifi	ed in clause A.3.15	
			Ad	oA1	AoA2	
Assumption for UE beams <sup>Note</sup>		Config 1,2	Ro	ugh	F	Rough
NR RF Channel Number		Config 1,2		1		2
Duplex mode		Config 1,2		DD		TDD
BW <sub>channel</sub>	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,2		66		66
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBV	VP.0.1		NA
Initial UL BWP		Config 1,2	DLBV	VP.0.1		N/A
Dedicated DL BWP		Config 1,2	DLBWP.1.1			NA
Dedicated UL BWP		Config 1,2	ULBWP.1.1			NA
OCNG Patterns defined in A.3.2.1.1		Config 1,2	0	P.1	(	OP.1
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	3.1 TDD		-
TRS configuration		Config 1,2	TRS.2	.1 TDD	NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.State.2			NA
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	120			120
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS		Config 1,2		0		0

EPRE ratio of PBCH to PBCH DMRS									
EPRE ratio of PDCCH DMRS to SSS									
EPRE ratio of PDCCH to PDCCH DMRS									
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS to SSS(Note 1)									
EPRE ratio of OCNG to OCNG DMRS (Note 1)									
Ês	dBm/S CS	Config 1	-87	-87	-Infinity	-87			
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87			
$\hat{E}_{s}/I_{ot\ BB\ Note\ 8}$	dB	Config 1,2	1.89	1.89	-Infinity	1.89			
lo Note3	dBm/95 .04 MHz <sub>Note5</sub>	Config 1,2	-58.01	-58.01	-Infinity	-58.01			
Propagation Condition		Config 1,2		/GN		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: Void  Note 3: SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes.  They are not settable parameters themselves.									
Note 4: Void									
Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone  Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or									

# A.5.6.2.3.2 Test Requirements

Note 8:

test system implementation

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

UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the

associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

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<sub>DCCH</sub> 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.

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:	The 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.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 frequency is used.
NR RF Channel Number		Config 1,2	1, 2				Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)			INR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3				NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2				As specified in clause 9.1.2-1.	

Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.3 FR2			As specified in clause A.3.10.2	
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	ıl			
TimeToTrigger	s	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	Зµѕ				Synchronous cells.
T1	s	Config 1,2	5				
T2	S	Config 1,2	11 for PC1; 6.5 for othe r PC	108 for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	108 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	Ce	ell 2	(	Cell 3
		configuratio n	T1	T2	T1	T2
AoA setup		Config 1,2	Setu	p 1 as speci	fied in claus	e A.3.15
Assumption for UE beams <sup>Note</sup>		Config 1,2	Ro	ugh	F	Rough
NR RF Channel Number		Config 1,2		1		2
Duplex mode		Config 1,2	TI	DD		TDD
BW <sub>channel</sub>	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,2	6	66		66
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	onf.3.1	TDDConf.3.1	
Initial DL BWP		Config 1,2	DLBV	VP.0.1	NA	
Initial UL BWP		Config 1,2	ULBV	VP.0.1		
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1		NA
OCNG Patterns defined in A.3.2.1.1		Config 1,2	OP.1			OP.1
PDSCH Reference measurement channel		Config 1,2	SR.3.1 TDD		SR.3.1 TDD -	
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-

Dedicated CORESET Reference Channel		Config 1,2	CCR.3	3.1 TDD		-	
TRS configuration		Config 1,2	TRS.2	.1 TDD	N	IA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.S	State.2	N	IA	
SMTC configuration defined in A.3.11		Config 1,2	SM	TC.1	SM	TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1.	20	1:	20	
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH  DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH 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)  Noc Note2	dBm/15 kHz	Config 1,2	-104.7			-104.7	
$N_{oc}$ Note2	Note5 dBm/S CS Note4	Config 1,2	-9	5.7	-9	5.7	
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-89.7	-89.7	-Infinity	-86.7	
$\hat{E}_s/I_{ot}$	dB	Config 1,2	6	6	-Infinity	9	
$\hat{E}_s/N_{oc}$ ONote3	dB	Config 1,2	6	6	-Infinity	9	
O <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1,2	-59.7	-59.7	-66.7	-57.2	
	Note5	Config 1,2		 /GN	AW		

Note 1: OCNG shall be 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: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

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

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

### A.5.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

#### A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,
	duplex mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode
	duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	

4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD							
	duplex mode							
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD							
	duplex mode							
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD							
	duplex mode							
Note: The U	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		Config		1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6			frequency is used.
NR RF Channel		Config	1	, 2	One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6			frequency is used.
Active cell		Config	LTE Cell 1 (Po	Cell) and NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (PScell)		channel number 1.
					NR Cell 2 is on NR RF channel
		0 "	ND 11.0		number 1.
Neighbour cell		Config	NR cell 3		NR cell 3 is on NR RF channel
One Datte and Lil		1,2,3,4,5,6	0	1.0	number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.
Measurement gap		Config	39	39	
offset		1,2,3,4,5,6	39	39	
SMTC-SSB parameters		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		, , , , , , , , , , , , , , , , , , ,			
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters		Config	SSB.3 FR2		As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6	00D.01112		7.6 specified in clause 76.16.2
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		
offsetMO	dB	Config	6		
		1,2,3,4,5,6			
Hysteresis	dB	Config	0		
a A Thomas had also	ID.	1,2,3,4,5,6	405		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config	Normal		
or length		1,2,3,4,5,6	inomiai		
TimeToTrigger	s	Config	0		
		1,2,3,4,5,6	~		
Filter coefficient		Config	0		L3 filtering is not used
		1,2,3,4,5,6			
DRX		Config	OFF		DRX is not used
		1,2,3,4,5,6			
Time offset between		Config	3 μs		Synchronous EN-DC
PCell and PSCell Time offset between		1,2,3,4,5,6	2		A complete manage and the
serving and neighbour		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later
cells					than the timing of Cell 2.
00110	l	l	1		and and diffing of Ooli Z.

		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	С	ell 2	Cell 3	
		configuratio n	T1	T2	T1	T2
AoA setup		Config	N/A		Setup 1 a	as specified in
•		1,2,3,4,5,6				se A.3.15
Assumption for UE beams <sup>Note</sup>		Config	1	N/A	F	Rough
7		1,2,3,4,5,6				
NR RF Channel Number		Config		1		2
		1,2,3,4,5,6				
Duplex mode		Config 1,4		DD	_	TDD
		Config	T	DD		TDD
		2,3,5,6				
BW <sub>channel</sub>	MHz	Config 1,4		RB,c = 52		$N_{RB,c} = 66$
		Config 2,5		<sub>RB,c</sub> = 52	100:	$N_{RB,c} = 66$
		Config 3,6	40: N <sub>F</sub>	$R_{B,c} = 106$	100:	$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4	10: N	<sub>RB,c</sub> = 52	100:	$N_{RB,c} = 66$
		Config 2,5	10: N	RB,c = 52	100:	N <sub>RB,c</sub> = 66
		Config 3,6		RB,c = 106	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,4		52		66
		Config 2,5		52		66
		Config 3,6	106			66
TDD configuration		Config 2,5	TDDConf.1.1		TDD	Conf.3.1
		Config 3,6	TDDConf.2.1		TDD	Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLB	WP.0.1	NA	
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		ULBWP.0.1 NA	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLB	WP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULB	WP.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	C	)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		.1 TDD	+	
RMSI CORESET Reference		Config 1,4		.1 FDD	+	
Channel		Config 2,5	CR 1	.1 TDD	+	
		Config 3,6		.1 TDD	+	
Dedicated CORESET Reference Channel		Config 1,4		1.1 FDD		-
T.S. STOTION CHAIRING		Config 2,5	CCR.	1.1 TDD		

		Config 3,6	CCR.2.1 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 spacing	kHz	Config 1,2,4,5	15		20
		Config 3,6	30	1	20
EPRE ratio of PSS to SSS		Config 1,2,3,4,5,6	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)					
Ês	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87
$\hat{E}_{_{s}}/I_{_{ot}}$ BB <sup>Note 8</sup>	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69
Io <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	-	-Infinity	-58.01
Propagation Condition		Config 1,2,3,4,5,6		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: SSB\_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void.
- 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
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 8: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

#### 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

#### A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.6.1-1.

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	E is only required to be tested in one of the supported test configurate	tions

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		Va	/alue		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					frequency is used.
NR RF Channel		Config		1,	2		One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6					frequency is used.
Active cell		Config	LTF C	ell 1 (PC	Cell) and	1 NR	LTE Cell 1 is on E-UTRA RF
7.0		1,2,3,4,5,6		(PScell)	Jon, and		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			ı		number 2.
Gap Pattern Id		Config	0		13		As specified in clause 9.1.2-1.
		1,2,3,4,5,6	00				
Measurement gap		Config	39		39		
offset SMTC-SSB parameters		1,2,3,4,5,6 Config 1,4	SSB.1	ED4			As specified in clause A.3.10.1
on NR RF Channel 1		Coming 1,4	JOD. I	ı⁻IX İ			As specified it! clause A.S. 10.1
on we are on a more		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		201g 2,0	005.1				/ to opcomed in olddes / i.e. re. r
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
		•					·
SMTC-SSB parameters		Config	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					
CSI-RS for tracking		Config 1,4		.1 FDD			
		Config 2,5		.1 TDD			
offsetMO	dB	Config 3,6		.2 TDD			
Onsellvio	иь	Config 1,2,3,4,5,6	6				
Hysteresis	dB	Config	0				
Tryotoroolo	u B	1,2,3,4,5,6					
a4-Threshold	dBm	Config	-105				
		1,2,3,4,5,6					
CP length		Config	Norma	al			
		1,2,3,4,5,6					
TimeToTrigger	S	Config	0				
Filter coefficient		1,2,3,4,5,6	0				LO filtoniam in mot wood
riiter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		1,2,3,4,5,6 Config	DRX	DRX	DRX	DRX	As specified in clause A.3.3
		1,2,3,4,5,6	.1	.7	.1	.7	/ to opposition in bladdo / t.b.b
Time offset between		Config	3 μs				Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6					
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 3 is 3ms later
cells		0 "					than the timing of Cell 2.
		Config	3µs				Synchronous cells.
		2,3,5,6					
T1	S	Config	5				
		1,2,3,4,5,6					

T2	S	Config	8 for	82	8 for	82	
		1,2,3,4,5,6	PC1;	for	PC1;	for	
			5 for	PC1;	5 for	PC1;	
			othe	52	othe	52	
			r PC	for	r PC	for	
				othe		other	
				r PC		PC	

Table A.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					
AoA setup		Config	N/A			s specified in	
		1,2,3,4,5,6				se A.3.15	
Assumption for UE beams <sup>Note</sup>		Config	N	I/A	F	Rough	
/		1,2,3,4,5,6					
NR RF Channel Number		Config		1		2	
		1,2,3,4,5,6		20		TDD	
Duplex mode		Config 1,4		DD	_	TDD	
		Config 2,3,5,6		DD		TDD	
BW <sub>channel</sub>	MHz	Config 1,4		B,c = 52	100:	$N_{RB,c} = 66$	
		Config 2,5	10: N <sub>R</sub>	B,c = 52		$N_{RB,c} = 66$	
		Config 3,6		s,c = 106		$N_{RB,c} = 66$	
BWP BW	MHz	Config 1,4		B,c = 52		$N_{RB,c} = 66$	
		Config 2,5		B,c = 52		$N_{RB,c} = 66$	
		Config 3,6	40: N <sub>RE</sub>	<sub>3,c</sub> = 106	100:	$N_{RB,c} = 66$	
Data RBs allocated		Config 1,4		52		66	
		Config 2,5	-	52		66	
		Config 3,6		06		66	
TDD configuration		Config 2,5	TDDConf.1.1		TDDConf.3.1		
		Config 3,6	TDDConf.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	III DV	VP.0.1		NA	
		1,2,3,4,5,6					
Dedicated DL BWP		Config	DLBV	VP.1.1		NA	
		1,2,3,4,5,6					
Dedicated UL BWP		Config	ULBV	VP.1.1		NA	
		1,2,3,4,5,6					
OCNG Patterns defined in		Config	Ol	P.1	(	OP.1	
A.3.2.1.1 (OP.1)		1,2,3,4,5,6					
PDSCH Reference		Config 1,4	SR.1.	1 FDD			
measurement channel		Config 2,5	SR.1.1 TDD		1		
		Config 3,6	SR2.1 TDD		7		
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD			-	
Channel		Config 2,5	CR.1.1 TDD		+		
		Config 3,6	CR2.1 TDD				
Dedicated CORESET		Config 1,4		CCR.1.1 FDD -		-	
Reference Channel		, , ,					
		Config 2,5	CCR.1	.1 TDD			
I							

		Config 3,6	CCR.2.1 TDD			
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SM	TC.2	
		Config 2,3,5,6	SMTC.1	SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15	1	20	
		Config 3,6	30	1	20	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	0		0	
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6				
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{\it oc}$ Note2	dBm/15 kHz Note5			-10	04.7	
$N_{oc}^{ m Note2}$	dBm/S CS	Config 1,2,4,5		-9	5.7	
	Note4	Config 3,6		-9	-95.7	
SSB_RP Note 3	dBm/S CS	Config 1,2,4,5		-Infinity	-86.7	
	Note5	Config 3,6		-Infinity	-86.7	
$\hat{E}_s/I_{ot}$	dB	Config		-Infinity	9	
A /w	dB	1,2,3,4,5,6 Config	N/A Link only, see clause	-Infinity	9	
$\hat{E}_s/N_{oc}$	uв	1,2,3,4,5,6	A.3.7A	-inimity	9	
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2,4,5				
	dBm/38 .16MHz	Config 3,6		-	-	
	dBm/95 .04 MHz	Config 1,2,3,4,5,6		-66.7 -57.2		
Propagation Condition	Note5	Config 1,2,3,4,5,6		AV	VGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be
	fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SSB_RP 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
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

#### A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,
	duplex mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode
	duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	
	duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	
	duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
Note: The U	E is only required to be tested in one of the supported test configura	itions

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		Config		1	One E-UTRAN TDD carrier		
Number		1,2,3,4,5,6			frequency is used.		
NR RF Channel Number		Config 1,2,3,4,5,6	1,	, 2	One FR1 and one FR2 NR carrier frequency 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		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.3 FR2		As specified in clause A.3.10.2		
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				
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	-105								
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		OFF		OFF		OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		3 µs		Synchronous EN-DC				
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.						
		Config 2,3,5,6	3μs		Synchronous cells.						
T1	S	Config 1,2,3,4,5,6	5								
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC							

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2			Cell 3				
		configuratio	T1	T2	T1	T2				
		n				L				
AoA setup		Config	N	I/A		s specified in				
No.		1,2,3,4,5,6				se A.3.15				
Assumption for UE beams <sup>Note</sup>		Config	N	I/A	F	lough				
		1,2,3,4,5,6								
NR RF Channel Number		Config		1		2				
		1,2,3,4,5,6								
Duplex mode		Config 1,4		DD		TDD				
		Config	TI	DD		TDD				
		2,3,5,6								
BWchannel	MHz	Config 1,4		$_{\rm B,c} = 52$	100: N <sub>RB,c</sub> = 66					
		Config 2,5 10: N <sub>RB,c</sub> = 52		$_{\rm B,c} = 52$	100: N <sub>RB,c</sub> = 66					
		Config 3,6	40: Nr	s,c = 106	100:	$N_{RB,c} = 66$				
BWP BW	MHz	Config 1,4	10: N <sub>R</sub>	$_{\rm B,c} = 52$	100: $N_{RB,c} = 66$					
		Config 2,5	10: N <sub>R</sub>	$_{\rm B,c} = 52$	100:	$N_{RB,c} = 66$				
		Config 3,6	40: Nr	40: N <sub>RB,c</sub> = 106		40: $N_{RB,c} = 106$		$N_{RB,c} = 66$		
Data RBs allocated		Config 1,4	5	52		66				
		Config 2,5	5	52		66				
		Config 3,6	1	106		106		66		
OCNG Patterns defined in		Config	0	P.1	(	OP.1				
A.3.2.1.1 (OP.1)		1,2,3,4,5,6								
PDSCH Reference		Config 1,4	SR.1.	SR.1.1 FDD		-				
measurement channel		Config 2,5	SR.1.1 TDD							
		Config 3,6	SR2.1 TDD		<u> </u>					
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		R.1.1 FDD -	
Channel		Config 2,5	CR.1.	1 TDD						
		Config 3,6	CR2.	1 TDD						

	1	_		ı	
Dedicated CORESET Reference Channel		Config 1,4	CCR.1.1 FDD		-
		Config 2,5	CCR.1.1 TDD		
		Config 3,6	CCR.2.1 TDD		
TDD configuration		Config 2,5	TDDConf.1.1	TDD	Conf.3.1
		Config 3,6	TDDConf.2.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1		NA
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SI	MTC.2
		Config 2,3,5,6	SMTC.1	SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15		120
5555 # (500 t 600		Config 3,6	30		120
EPRE ratio of PSS to SSS		Config 1,2,3,4,5,6	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)					
Ês	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87
$\hat{E}_{_{s}}/I_{_{ot}}$ BB <sup>Note 8</sup>	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69
Io <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6		-Infinity	-58.01
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:	Void
Note 3:	SS-RP, Es/lot and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	Void
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
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

### A.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

#### A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.8.1-1.

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	E is only required to be tested in one of the supported test configura	ations

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config		•	1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequency is used.
NR RF Channel		Config		1,	2		One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6					frequency is used.
Active cell		Config	LTE C	ell 1 (PC	Cell) and	NR I	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (	(PScell)	•		channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	0		13		As specified in clause 9.1.2-1.
		1,2,3,4,5,6					
Measurement gap		Config	39		39		
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1							
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
		_					·
SMTC-SSB parameters		Config	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					
CSI-RS for tracking		Config 1,4		.1 FDD			
		Config 2,5		.1 TDD			
		Config 3,6	TRS.1	.2 TDD			
offsetMO	dB	Config	6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
a4-Threshold	dBm	Config	-105				
		1,2,3,4,5,6	L				
CP length		Config	Norma	al			
		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		Config 1,2,3,4,5,6	DRX .1	DRX .7	DRX .1	DRX .7	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	Зµѕ				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	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.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	ell 2		Cell 3
		configuratio	T1	T2	T1	T2
		n o "		1/4	0	.6. 1.
AoA setup		Config	N	I/A		s specified in
A C LUE L Note		1,2,3,4,5,6		1/4		se A.3.15
Assumption for UE beams <sup>Note</sup>		Config	N	I/A	K	lough
ND DE Object of November		1,2,3,4,5,6		4		0
NR RF Channel Number		Config		1		2
		1,2,3,4,5,6		DD		TDD
Duplex mode		Config 1,4		DD		TDD
		Config	1	DD		TDD
DIM	N 41 1	2,3,5,6	40.11		100	NI 00
BW <sub>channel</sub>	MHz	Config 1,4		RB,c = 52		N <sub>RB,c</sub> = 66
		Config 2,5		RB,c = 52		N <sub>RB,c</sub> = 66
		Config 3,6		B,c = 106	_	$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4		RB,c = 52		$N_{RB,c} = 66$
		Config 2,5		RB,c = 52	_	$N_{RB,c} = 66$
		Config 3,6	40: N <sub>RI</sub>	<sub>B,c</sub> = 106	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,4		52		66
		Config 2,5	į	52		66
		Config 3,6	1	06		66
OCNG Patterns defined in		Config	0	P.1		OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.	.1 FDD		-
measurement channel		Config 2,5	SR.1.	.1 TDD		
		Config 3,6	SR2.	1 TDD		
RMSI CORESET Reference		Config 1,4	CR.1	.1 FDD		-
Channel		Config 2,5	CR.1	.1 TDD		
		Config 3,6	CR2.	1 TDD		
Dedicated CORESET Reference Channel		Config 1,4	CCR.1	I.1 FDD		-

		Config 2,5	CCR.1.1 TDD	
		Config 3,6	CCR.2.1 TDD	
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.3.1
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
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
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 spacing	kHz	Config 1,2,4,5	15	120
5005 // (000 / 000		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		
PDCCH DMRS  EPRE ratio of PDSCH DMRS		1,2,3,4,5,6	0	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)				
$N_{\it oc}^{}$ Note2	dBm/15 kHz Note5			-104.7
$N_{oc}$ Note2	dBm/S CS	Config 1,2,4,5		-95.7
	Note4	Config 3,6		-95.7
SSB_RP Note 3	dBm/S CS	Config 1,2,4,5	N/A	-Infinity -86.7
$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$	Note5 dB	Config 3,6 Config	Link only, see clause A.3.7A	-Infinity -86.7 -Infinity 9
$\hat{E}_s/N_{oc}$	dB	1,2,3,4,5,6 Config 1,2,3,4,5,6		-Infinity 9
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2,4,5		
	dBm/38 .16MHz	Config 3,6		

			·			
	dBm/95	Config		-66.7	-57.2	
	.04	1,2,3,4,5,6				
	MHz					
	Note5					
Propagation Condition		Config		A'	WGN	
. 0		1,2,3,4,5,6				
Note 1: OCNG shall be used	such that b	oth cells are ful	y allocated and a constar	nt total trans	mitted power	
spectral density is ac	hieved for a	all OFDM symbo	ols.			
Note 2: Interference from oth	er cells and	noise sources	not specified in the test is	assumed to	be constant	
			as AWGN of appropriate			
fulfilled.						
Note 3: SSB RP and lo level	s have bee	n derived from o	other parameters for inforr	mation purp	oses. They	
are not settable para						
Note 4: SSB RP minimum re	quirements	are specified a	ssuming independent inte	rference an	d noise at	
	each receiver antenna port.					
Note 5: Equivalent power red	Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 6: As observed with 0dl	, ,					
Note 7: Information about type	es of UE b	eam is given in l	B.2.1.3, and does not limit	t UE implem	entation or	

#### A.5.6.2.8.2 **Test Requirements**

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

test system implementation

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.5.6.3 L1-RSRP measurement for beam reporting

#### A.5.6.3.1 SSB based L1-RSRP measurement when DRX is not used

#### A.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

#### A.5.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 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
BW <sub>channel</sub>	1~4	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~4		66
PDSCH Reference	1,2		SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD
Channel	3,4		CR.3.2 TDD
Dedicated CORESET	1~4		CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD
CCD configuration	1,2		SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2
DRX configuration	1~4		Off
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	320
T1	1~4	S	5
T2	1~4	S	2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	1~4	dB	0

EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~4		AWGN
Note 1: OCNG shall be used s	such that bot	h cells are fully	allocated and a

Table A.5.6.3.1.2-2: SSB specific test parameters

Doromotor	Confin	l lmi4	SSB#0		SSB#1	
Parameter	Config	Unit	T1	T2	T1	T2
Angle of arrival configuration			T1         T2         T1         T2           Setup 1 according to A.3.15.1           Rough           -105           -96           -93           0         0         -Infinity         9           -96         -96         -Infinity         -8           -93         -93         -Infinity         -8			15.1
Assumption for UE beams <sup>Note 4</sup>	1~4			Ro	ugh	
$N_{_{\!OC}}$ Note2	1~4	dBm/15kHz				
λ/ Note2	1,2	dDm/SSD SCS				
$N_{_{OC}}^{}$ Note2	3,4	UBIII/SSB SCS				
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	1~4	dB	0	0	-Infinity	9
SSB_RP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87
00D_I(I	3,4	Unit         T1           Setu           dBm/15kHz           dBm/SSB SCS           dB         0           dBm/SSB SCS         -96           -93         -93	-93	-Infinity	-84	
Io Note3	1,2	dPm/05 04MHz	-63.97	-63.97	-66.98	-57.47
IU ·····	3,4	UDITI/93.04IVITIZ	-63.97	-63.97	-105 -96 -93 -Infinity -Infinity -166.98 -5	-57.47
$\hat{E}_s/N_{oc}$	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 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: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.6.3.1.3 Test Requirements

#### A.5.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.5.6.3.2 SSB based L1-RSRP measurement when DRX is used

#### A.5.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

#### A.5.6.3.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.2.2-1 and Table A.5.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BW <sub>channel</sub>	1~4	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~4		66
PDSCH Reference	1,2		SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD
Channel	3,4		CR.3.2 TDD
Dedicated CORESET	1,2		CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD

CCP configuration	1,2		SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1
Illidal BWF Corlingulation	1~4		ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3
Dedicated BVVI corniguration			ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI	1~4		TCI.State.2
Configuration	1~4		TOI.State.2
DRX configuration	1~4		DRX.3
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	320
T1	1~4	S	5
T2	1~4	S	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	1~4	dB	0
EPRE ratio of PDSCH to PDSCH	' '	u.b	Ŭ
DMRS			
EPRE ratio of OCNG DMRS to			
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1 Propagation condition	1~4		AWGN
Note 1: OCNO abolt be wood a			

Table A.5.6.3.2.2-2: SSB specific test parameters

Parameter	Config	onfig Unit		B#0	SSB#1		
Parameter	Config	Onit	T1	T2	T1	T2	
Angle of arrival configuration			Set	up 1 accord	ding to A.3.	15.1	
Assumption for UE beams <sup>Note 4</sup>	1~4			Ro	ugh		
$N_{oc}^{ m Note2}$	1~4	dBm/15kHz	T1         T2         T1         T2           Setup 1 according to A.3.15.1           Rough           -105           -96           -93           -96         -93           -96         -96           -93         -93           -93         -93           -63.97         -66.98           -57.4				
<b>Ŋ</b> Note2	1,2	dBm/SSB SCS	dDm/CCD CCC		-96		
$N_{oc}^{ m Note2}$	3,4	UBIII/33B 3C3	-93				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~4	dB	0	0	-Infinity	9	
SSB RP Note3	1,2	dB dB dBm/SSB SCS	-96	-96	-Infinity	-87	
OOD_IXI	3,4	dBill/OOB OOO	-93	1 T2 T1  Setup 1 according to A.3.1  Rough -105 -96 -93 0 0 -Infinity 06 -96 -Infinity 03 -93 -Infinity 0.97 -63.97 -66.98 0.97 -66.98	-84		
lo Note3	1,2	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47	
10	3,4	UDIII/93.04WIAZ	-63.97	-63.97	-93  -Infinity	-57.47	
$\hat{E}_s/N_{oc}$	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 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:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

### 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 SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

#### A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW <sub>channel</sub>	1~2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.3 TDD
RMSI CORESET Reference Channel	1~2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.7 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.1.1 ULBWP.1.1
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		8
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	· -		
EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS			
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1	1~2	dB	0
EPRE ratio of OCNG to OCNG DMRS Note 1			

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Parameter Config	Unit	CSI-RS#0	CSI-RS#1	
------------------	------	----------	----------	--

Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1	
Assumption for UE beams <sup>Note 4</sup>	1~2		Rough	
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105	
$N_{oc}^{ m Note1}$	1~2	dBm/SSB SCS	-95	5.97
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	9
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97
lo <sup>Note2</sup>	1~2	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	9

Note 2: Interference from other cells and noise sources not 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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

#### A.5.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3	
CSI-RS0		CSI-RS _RP0 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP0 + $\delta$ + G <sub>max</sub>	
CSI-RS1		CSI-RS _RP1 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 + $\delta$ + G <sub>max</sub>	
Note 1:	te 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration		
Note 2:	Note 2: $\delta$ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test		
Note 3:			

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

#### A.5.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.4.1-1.

Table A.5.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

#### A.5.6.3.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.4.2-1 and Table A.5.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.4.2-1: 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 <sub>RB,c</sub> = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.3 TDD
RMSI CORESET Reference Channel	1~2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.7 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.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD

PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
gal Info	1~2		SSB#0 for resource#0
qcl-Info	1~2		SSB#1 for resource#1
reportSlotOffsetList	1~2		8
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	1~2	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Nata 4. OONO aballiba waada	and the Charles	l II	aller all a catacida a calca

Table A.5.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1	
Assumption for UE beams <sup>Note 4</sup>	1~2		Ro	ugh
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-1	05
$N_{oc}^{ m Note1}$	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 <sup>Note2</sup>	1~2	dBm/95.04MHz	-63.97	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	9

Note 2: Interference from other cells and noise sources not 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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.6.3.4.3 Test Requirements

After1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 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.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3	
CSI-RS0		CSI-RS _RP0 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP0 + $\delta$ + G <sub>max</sub>	
CSI-RS1		CSI-RS _RP1 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP1 + $\delta$ + G <sub>max</sub>	
Note 1:	ote 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration		
Note 2: $\delta$ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the used in the test		olute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo	
Note 3:	Note 3: G <sub>min</sub> and G <sub>max</sub> are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class		

The rate of correct events observed during repeated tests shall be at least 90%.

### A.5.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC\_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

#### A.5.7.1 SS-RSRP

# A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

#### A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

#### A.5.7.1.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.1.1.2-2 and A.5.7.1.1.2-3. The E-UTRA PCell is configured as specified in clause A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 is the target cell. The test consists of two time phases T1 and T2.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration		Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired 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 <sup>Note 5</sup>		Unit	Т	T1		T2		
	Farameter		Cell 2	Cell 3	Cell 2	Cell 3		
Physical cell ID			489	0	489	0		
SSB ARFCN			fre	•	fre	•		
Duplex mode				DD		DD		
TDD configuration			TDDC		TDDC			
BW <sub>channel</sub>		MHz	100: N <sub>F</sub>	$R_{B,c} = 66$	100: N <sub>R</sub>	$_{B,c} = 66$		
Data RBs allocated			2	4	_	4		
	Initial DL BWP				VP.0.1			
BWP configuration	Dedicated DL BWP				VP.1.1			
	Initial UL BWP				VP.0.1			
	Dedicated UL BWP			ULBV	VP.1.1			
TRS configuration			TRS.2.		TRS.2.			
1K3 configuration			1 TDD	-	1 TDD	-		
TCI state			TCI.Sta	_	TCI.Sta	_		
TOTState			te.0		te.0			
PDSCH Reference m	easurement channel		SR.3.2	_	SR.3.2	_		
1 DOOT I REICHOLING	casarement channel		TDD		TDD			
			CR.3.1		CR.3.1			
RMSI CORESET Ref	erence Channel		TDD	-	TDD	-		
			CCR.3.		CCR.3.			
Dedicated CORESE	Reference Channel		1 TDD	-	1 TDD	-		
OONO Delleres			000	00.0	00.0	000		
OCNG Patterns			OP.3 SSB.3	OP.3 SSB.3	OP.3 SSB.3	OP.3 SSB.3		
SSB configuration			FR2	FR2	FR2	FR2		
-			SMTC.	SMTC.	SMTC.	SMTC.		
SMTC configuration			1 SWITC.	3W1C.	1 SWITC.	3W1C.		
Time offset with Cell	2	μS	- '	3	_	3		
PDSCH/PDCCH subcarrier spacing		μο kHz	120	120	120	120		
EPRE ratio of PSS to SSS		IXI IZ	120	120	120	120		
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH								
EPRE ratio of PDCCI								
EPRE ratio of PDCCI	dB	0	0	0	0			
EPRE ratio of PDSCI								
EPRE ratio of PDSCI								
EPRE ratio of OCNG								
	20 10 000				<u> </u>			

EPRE ratio of OCNG to OCNG DMRS Note		
Propagation conditions	AWGN AWGN	
Antenna configuration	1x2 1x2 1x2 1x2	2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Note 6: Void

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter	Unit	Т	1	Т	72	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1				
Assumption for UE beams <sup>Note 8</sup>			Rough			
$N_{oc}$ Note1	dBm/15kH z <sup>Note4</sup>	-9	1.6	N	/A	
$N_{oc}$ Note1	dBm/SCS Note4	-83	2.6	N	I/A	
$\hat{E}_s/N_{oc}$	dB	6.0	1.0	N/A	N/A	
Es	dBm/SCS Note4	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
SSB_RP <sup>Note2</sup>	dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note6	dB	2.44	-5.98	-5.98	-5.98	
lo <sup>Note2</sup> dBm/95.04 MHz Note4 -50.05 (Table B.2.2-2 Rx Beam Peak +29.70dB)						
	used, interfere ed in the test is					

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled

Note 2: SSB\_RP, Es/lot, Es in test 1 and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: Calculation of Es/lot\_BB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor  $\Delta$ MBp from TS 38.101-2 [19] Table 6.2.1.3-4.

Note 7: All parameters apply for configurations 1 and 2

Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

### A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

#### During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

#### During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

#### During T1 and T2:

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 3 during T2 compared with Cell 3 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	Cell 2	SSB_RP2 - $\delta$ +G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ SSB_RP2 + $\delta$ +G <sub>max</sub>		
	Cell 3	SSB_RP3 - $\delta$ +G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP3 + $\delta$ +G <sub>max</sub>		
Note 1:	SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration			
Note 2:	δ is the RSRP absoused in the test	olute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo		
Note 3:	G <sub>min</sub> and G <sub>max</sub> are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class		

## A.5.7.1.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

#### A.5.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.1.2.1-1.

Table A.5.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex
	mode

2	TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

### A.5.7.1.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
	_	Offic	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~4		freq1	freq2	freq1	freq2
BW <sub>channel</sub>	1~4			00: = 66	100: N <sub>RB.c</sub> = 66	
Data RBs allocated	1,2			4	2	4
Data RBS allocated	3,4		4	.8	4	8
Duplex mode	1~4		TE	DD	TE	DD
TDD configuration	1~4		TDDC	onf.3.1	TDDC	onf.3.1
PDSCH Reference	1,2		SR.3.2 TDD	_	SR.3.2 TDD	_
measurement channel	3,4		SR.3.3 TDD	-	SR.3.3 TDD	-
RMSI CORESET	1,2		CR.3.1 TDD		CR.3.1 TDD	
Reference Channel	3,4		CR.3.2 TDD	-	CR.3.2 TDD	-
Dedicated CORESET	1,2		CCR.3.1 TDD		CCR.3.1 TDD	
Reference Channel	3,4		CCR.3.7 TDD	-	CCR.3.7 TDD	-
SSB configuration	1,2		SSB.3 FR2		SSB.3 FR2	
	3,4		SSB.	4 FR2	SSB.4 FR2	
PDSCH/PDCCH subcarrier spacing	1~4	kHz	12	20	120	
OCNG Patterns	1~4			P.3	OP.3	
Initial BWP	1~4			/P.0.1	DLBW	
Configuration				/P.0.1	ULBW	
Dedicated BWP	1~4			/P.1.3		/P.1.3
configuration TRS Configuration	1~4			/P.1.3 .1 TDD		/P.1.3 .1 TDD
PDCCH/PDSCH TCI						
Configuration	1~4		TCI.S	tate.2	TCI.S	tate.2
SMTC configuration	1~4		SMT	ΓC.1	SMT	ΓC.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	1~4	dB	0	0	0	0

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 <sup>Note 1</sup>						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~4	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~4	-	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is

achieved for all OFDM symbols.

Note 2: Void

Table A.5.7.1.2.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Tes	Test 1		st 2
Parameter	Coning	Onit	Cell 2	Cell 3	Cell 2	Cell 3
			Setup 4b according to		Setup 4b according to	
Angle of arrival				.3.15.4.2		.3.15.4.2
configuration	1~4		AoA1	AoA2	AoA1	AoA2
			Spherical	Rx Beam	Spherical	Rx Beam
Assumption for			coverage	Peak	coverage	Peak
Assumption for UE beams <sup>Note 7</sup>	1~4		Ro	ugh	Roi	ugh
	1, 2		-90.6	-90.6	(Table	(Table
λ7	1, 2	dBm/15kH	-90.0	-90.0	B.2.3-2	B.2.3-2
$N_{_{OC}}$ Note1		z <sup>Note4</sup>			Rx Beam	Rx Beam
	3, 4		-93.7	-93.7	Peak <sup>Note 8</sup> +1.97dB)	Peak <sup>Note 8</sup> -3.03dB)
					(Table	(Table
					B.2.3-2	B.2.3-2
	1, 2		-81.6	-81.6	Rx Beam	Rx Beam
	., _		00		Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>
λ7		dBm/SCS			+11.0dB)	+6.0dB)
$N_{\!{oc}}$ Note1		Note4			(Table	(Table
	3, 4		-81.7	-81.7	B.2.3-2	B.2.3-2
					Rx Beam	Rx Beam
					Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>
					+14.0dB)	+9.0dB)
$\hat{E}_{s}/N_{oc}$	1~4	dB	6.0	6.0	17.0	-1.0
					(Table	(Table
					B.2.3-2	B.2. 3-2
	1, 2		-75.6	-75.6	Rx Beam	Rx Beam
					Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>
SSB_RPNote2		dBm/SCS			+28.0dB)	+5.0dB)
335_1					(Table	(Table
	2.4		75.7	75.7	B.2.3-2	B.2. 3-2
	3, 4		-75.7	-75.7	Rx Beam Peak <sup>Note 8</sup>	Rx Beam Peak <sup>Note 8</sup>
					+31.0dB)	+8.0dB)
(SSB_RP <sub>Cell 2</sub> -				<u> </u>	/	,
SSB_RP <sub>Cell 3</sub> )	1~4	dB	0		23	.00
Ê/I	1, 2	dB	5.26	5.96	9.53	-3.46
$E_{ m s}/I_{ m otBB}$ Note6	3, 4	uБ	4.61	5.91	შ.ეე	-3. <del>4</del> 0

						(Table B.2.3-2	(Table B.2.3-2		
		1, 2		-50.00	-50.00	Rx Beam	Rx Beam		
		1, 2		-50.00	-50.00	Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>		
			dBm/95.04			+52.68dB)	+33.13dB)		
Io <sup>Note2</sup>			MHz Note4			(Table	(Table		
			IVII IZ			B.2.3-2	B.2.3-2		
		3, 4		-50.09	-50.09	Rx Beam	Rx Beam		
		3, 4		-30.09	-30.09	Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>		
						+55.69dB)	+36.14dB)		
(lOfreq 1 -	In trag 2)	1~4	dB	(	<u> </u>	,	.55		
Note 1:	Where used, interference from other cells and noise sources not specified in the t								
Note 1.	is assumed to be constant over subcarriers and time and shall be modelled as AWGN								
					timo ana ona	ii bo modellet	2 40 7 111 011		
	of appropriate power for $N_{oc}$ to be fulfilled.								
Note 2:	SSB_R	P, Es/lot, lo, (	SSB_RP <sub>Cell 3</sub>	- SSB_RP <sub>Cell</sub>	2) and (lofreq 2	– lo freg 1) lev	els have		
			SB_RP, Es/lot, Io, (SSB_RP <sub>Cell 3</sub> – SSB_RP <sub>Cell 2</sub> ) and (Io <sub>freq 2</sub> – Io <sub>freq 1</sub> ) levels have een derived from other parameters for information purposes. They are not settable						
	parame	eters themselv	es.			•			
Note 3:	Void	Void							
Note 4:	Equival	lent power rec	eived by an a	ntenna with 0	dBi gain at th	ne centre of the	ne quiet		
	zone								
Note 5:	Void								
Note 6:			B includes the						
			ociated Refser						
	and an allowance of 1dB for UE multi-band relaxation factor ΔMB <sub>P</sub> or ΔMB <sub>S</sub> from TS				s from TS				
	38.101-2 [19] Table 6.2.1.3-4.								
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation			UE					
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS <sub>SSB</sub> = 120 kHz, selected according to the operating band of cell 3 and UE power class, without $\Delta$ MB <sub>P,n</sub>								
1									

#### A.5.7.1.2.3 Test Requirements

adjustment

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

#### Test 1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

#### Test 2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Table A.5.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes 1,2,3,4
Cell 2	SSB_RP2 - $\delta$ +G <sub>min</sub> +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 + $\delta$ +G <sub>max</sub>
Cell 3	SSB_RP3 -δ +G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP3 +δ+G <sub>max</sub>

Note 1:	SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
	configured in the test for the cell n under consideration

- Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test
- Note 3: G<sub>min</sub> and G<sub>max</sub> are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class
- Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.

Table A.5.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes 1,2,3,4, 5, 6, 7					
Cell 3 – Cell 2		SSB_RP3 - SSB_RP2 -δ - D - G <sub>inter</sub> ≤ Reported RSRP(dB) ≤ SSB_RP3 - SSB_RP2					
		$+\delta + G_{inter} - (X) + E$					
Note 1:	SSB_RPn is the eq	uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
	configured in the te	st for the cell n under consideration					
Note 2:	δ is the RSRP relat	tive accuracy requirement from Table 10.1.5.1.2-1					
Note 3:	Void						
Note 4:	X is the Spherical of	coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage)					
	from TS 38.101-2 [	[9] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating					
	band. X is always a	a negative value.					
Note 5:		e to mis-alignment between fine beam and rough beam. D is the Rough Beam gain					
	reduction in Rx bea	am peak direction from Table B.2.1.5.3-1, selected according to the UE power class.					
	D is always a positi	ive value.					
Note 6:	Ginter is the margin	due to different antenna gain caused by frequency separation. Ginter is from Table					
		ed according to the UE power class, and is always a positive value.					
		tional margin to account for the actual gain difference between peak direction and					
spherical	coverage using roug	gh beams.					

# A.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

#### A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz						
	bandwidth, FDD duplex mode						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz						
	bandwidth, TDD duplex mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz						
	bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	bandwidth, TDD duplex mode					
	bandwidth, FDD duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz						
	bandwidth, TDD duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz						
	bandwidth, TDD duplex mode						
Note: The U	JE is only required to be tested in one of the su	pported test configurations					

#### A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Absolute 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

Deventer	Confin	I Inc!4	Tes	st 1	Tes	st 2	
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~6		freq1	freq2	freq1	freq2	
	1,4		10:		10:		
	1,-		N <sub>RB,c</sub> = 52	400	N <sub>RB,c</sub> = 52		
BW <sub>channel</sub>	2,5	MHz	10:	100: N <sub>RB,c</sub> = 66	10:	100: N <sub>RB.c</sub> = 66	
			N <sub>RB,c</sub> = 52 40:	INRB,c = 00	N <sub>RB,c</sub> = 52 40:	INRB,c = OO	
	3,6		N <sub>RB,c</sub> = 106		N <sub>RB,c</sub> = 106		
Data DDa alla actad	1,2,4,5		52	0.4	52	00	
Data RBs allocated	3,6		106	24	106	66	
Gap pattern ID			(	)	(	)	
	1,4		FDD		FDD		
Duplex mode	2,5		TDD	TDD	TDD	TDD	
	3,6		TDD		TDD		
<u> </u>	1,4		N/A		N/A		
	2.5		TDDConf.	TDDConf.	TDDConf.	TDDConf.	
TDD configuration	2,5		1.1	3.1	1.1	3.1	
	3,6		TDDConf.	J. 1	TDDConf.	J. I	
	3,0		2.1		2.1		
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 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	1	
Reference Charmer	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	1	
Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
Reference Charmer	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	1	
	1,4		SSB.1		SSB.1		
	1,4		FR1		FR1		
SSB configuration	2,5		SSB.1	SSB.3	SSB.1	SSB.3	
33B configuration	2,5		FR1	FR2	FR1	FR2	
	3,6		SSB.2		SSB.2		
	3,0		FR1		FR1		
OCNG Patterns	1~6		OP.1	OP.3	OP.1	OP.1	
Initial BWP	1~6			/P.0.1	DLBW		
Configuration	1 0			/P.0.1	ULBWP.0.1		
Dedicated BWP	1~6			/P.1.3	DLBW		
configuration				/P.1.3	ULBW		
TRS Configuration	1~6		TRS.2	.1 TDD	TRS.2	.1 TDD	
PDCCH/PDSCH TCI	1~6		TCLS	tate.2	TCI.S	tate.2	
Configuration			101101012		i Oi.Glate.2		
SMTC configuration	1~6		SM	ΓC.1	SMT	ΓC.1	
Time offset between	1 0			•	_		
Cell 2 and Cell 3	1~6	μs		3	] 3	3	
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH	1~6	dB	0	0	0	0	
DMRS to SSS							

EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~6	-	NA	AWGN	NA	AWGN
Antenna configuration	1~6	-	Link only, see clause A.3.7A	1x2	Link only, see clause A.3.7A	1x2

Note 2: Void

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Donometer	Confin	Unit	Tes	st 1	Test 2 NOTE 3	
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b
Assumption for UE beams <sup>Note 4</sup>			N/A	Rough	N/A	Rough
$N_{oc}$	1~6	dBm/15 kHz		-90		NA
$N_{oc}$	1~6	dBm/SS B SCS		-80.97		NA
$\hat{E}_s/N_{oc}$	1~6	dB		5		NA
Es	1~6	dBm/SC S	NA Link only,		NA Link only,	(Table B.2.3-2 Spheric al coverag e +1dB)
SSB_RP <sup>Note1</sup>	1~6	dBm/SC S	see clause A.3.7A	-76.0	see clause A.3.7A	(Table B.2.3-2 Spheric al coverag e +1dB)
$\hat{E}/I_{ ext{otbb}^{ ext{Note6}}}$	1~6	dB		4.35		-3.81
Io <sup>Note1</sup>	1~6	dBm/ 95.04M Hz		-50.18		SSB_R P+28.9 8

Note 1: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5:	Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of
	appropriate power for $N_{oc}$ to be fulfilled.
Note 6:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor $\Delta$ MB <sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

#### Test 1:

Absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.3.3.

#### Test 2:

Absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.3.3.

Table A.5.7.1.3.3: SS-RSRP absolute accuracy test requirement

		Test requirement Notes 1, 2, 3, 4
	Cell 3	SSB_RP2 -δ +G <sub>min</sub> +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 +δ +G <sub>max</sub>
Note 1:	<del>-</del>	uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone st for the cell n under consideration
Note 2:	δ is the RSRP absorbed in the test	olute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo
Note 3:	G <sub>min</sub> and G <sub>max</sub> are t according to the UI	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected Epower class
Note 4:	X is the Spherical of	soverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating

#### A.5.7.2 SS-RSRQ

## A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

#### A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

#### A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

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 it	equired to pass in one of the supported test configurations

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

SSB ARFCN	Parameter		Unit	Tes	t 1	Test 2	
Duplex mode			Unit	Cell 2	Cell 3	Cell 2	Cell 3
TDDC configuration				Freq1		Freq1	
BWchannel				TD	D	TD	D
Data RBs allocated   BWP	•			TDDCo	nf.3.1	TDDC	onf.3.1
Initial DL BWP		MHz	100: N <sub>RE</sub>	$_{3,c} = 66$	100: N <sub>R</sub>	$_{\rm B,c} = 66$	
Dedicated DL BWP	Data RBs allocated			66			6
Initial UL BWP   Dedicated UL BWP   Dedicated UL BWP   Dedicated UL BWP   TRS.2.1   TRS.2.1   TDD	Initial DL BWP						
Dedicated UL BWP							
TRS configuration	configuration						
TDD		Dedicated UL BWP			ULB\	NP.1.1	
TCI state	TDC configuration			TRS.2.1		TRS.2.1	
Description	TK3 Corniguration			TDD			
PDSCH Reference measurement channel	TCI state			TCI.State		TCI.State	
TDD	TCI state			.0		.0	
RMSI CORESET Reference Channel	PDSCH Reference	measurement channel		SR.3.1		SR.3.1	
TDD	1 DOOIT Reference	measurement channel		_			
Control channel RMC	RMSI CORESET R	eference Channel			_		_
TDD	RMSI CORESET Reference Channel						
DD	Control channel RMC				_		_
SMTC configuration         SMTC.1           SSB configuration         SSB.3 SSB.3 FR2 FR2 FR2 FR2 FR2           PDSCH/PDCCH subcarrier spacing         kHz         120         120         120         120           SS-RSSI-Measurement         Not Applicable           EPRE ratio of PSS to SSS         EPRE ratio of PBCH_DMRS to SSS         EPRE ratio of PBCH_DMRS to SSS         EPRE ratio of PDCCH_DMRS to SSS         EPRE ratio of PDCCH_DMRS to SSS         BERE ratio of PDSCH_DMRS to SSS         EPRE ratio of PDSCH_DMRS to SSS         BERE ratio of OCNG DMRS to SSSNote 1         AWGN         AWGN           EPRE ratio of OCNG to OCNG DMRS Note 1         AWGN         AWGN         AWGN           Antenna Configuration         1x2         1x2         1x2         1x2							
SSB configuration  SSB.3 SSB.3 SSB.3 SSB.3 FR2  PDSCH/PDCCH subcarrier spacing kHz 120 120 120 120  SS-RSSI-Measurement  EPRE ratio of PSS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  AWGN				OP.1	_		OP.1
PDSCH/PDCCH subcarrier spacing kHz 120 120 120 120 SS-RSSI-Measurement Not Applicable  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 to SSS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  AWGN	SMTC configuration	1					
PDSCH/PDCCH subcarrier spacing kHz 120 120 120 120 SS-RSSI-Measurement Not Applicable  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 to SSS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  AWGN	SSB configuration						
SS-RSSI-Measurement  EPRE ratio of PSS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  Not Applicable  Not Applicable  AGB  AWGN  AWGN  AWGN  AWGN							
EPRE ratio of PSS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PBCH_DMRS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  AWGN			kHz	120			120
EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PBCH to PBCH_DMRS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH to PDCCH_DMRS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH to PDSCH_DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  1x2  1x2  1x2  1x2					Not Ap	pplicable	
EPRE ratio of PBCH to PBCH_DMRS  EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH to PDSCH_DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  1x2  1x2  1x2  1x2							
EPRE ratio of PDCCH_DMRS to SSS  EPRE ratio of PDCCH to PDCCH_DMRS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH to PDSCH_DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  1x2  1x2  1x2  1x2							
EPRE ratio of PDCCH_DMRS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS  EPRE ratio of PDSCH to PDSCH_DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  AWGN  1x2  1x2  1x2  1x2		-					
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  Propagation condition  AWGN  Antenna Configuration  AWGN  1x2  1x2  1x2  1x2							
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  Propagation condition  AWGN  Antenna Configuration  1x2 1x2 1x2 1x2			dВ	0	0	0	Λ
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup> EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  AWGN  Antenna Configuration  1x2 1x2 1x2 1x2	EPRE ratio of PDSCH_DMRS to SSS		uБ		U	U	U
Propagation condition  AWGN  Antenna Configuration  AWGN  AWGN  1x2  1x2  1x2  1x2							
Propagation condition AWGN AWGN Antenna Configuration 1x2 1x2 1x2 1x2							
Antenna Configuration 1x2 1x2 1x2 1x2	EPRE ratio of OCNG to OCNG DMRS Note 1						
	Propaga	tion condition		AWO	GN	AW	GN
	Antenna	Configuration		1x2	1x2	1x2	1x2

Note 2: Void Note 3: Void Note 4: Void

Note 5: Void

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

Baramatar	Linit	Tes	st 1	Te	st 2	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1 according to clause A.3.15.1		
Assumption for UE beams <sup>Note 9</sup>				Rough		
$N_{oc}^{}$ Note1	dBm/15kHz <sup>N</sup>	-9	95	-95		
$N_{oc}^{}$ Note1	dBm/SCS <sup>Note</sup>	CS <sup>Note</sup> -86		-86		
$\hat{E}_s/N_{oc}$	dB	3	3	-3	-3	
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-83	-83	-89	-89	
SS-RSRQ Note2	dB	-14.77	-14.77	-16.81	-16.81	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-1.76	-1.76	-4.76	-4.76	
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup> -5054					
Note 1: Interference from other cell	ls and noise sources r	ot specified	in the test	is assumed to	be constar	

- over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 2: SS-RSRQ, SSB\_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: Void
- Note 7: Void
- Note 8: Void
- Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.8.1.1. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3.

# 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

Parameter		Unit	Tes	st 1	Test 2	
Para	meter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN			Freq1	freq2	freq1	Freq2
Duplex mode				DD	TDD	
TDD configuration			TDDC		TDDC	
BW <sub>channel</sub>	MHz	100: N <sub>F</sub>	$R_{B,C} = 66$	100: N <sub>R</sub>	$_{B,c} = 66$	
Data RBs allocated			6	6	6	6
	Initial DL BWP				VP.0.1	
BWP configuration	Dedicated DL BWP				VP.1.1	
	Initial UL BWP				VP.0.1	
	Dedicated UL BWP			ULBV	VP.1.1	
TRS configuration			TRS.2.	_	TRS.2.	_
The configuration			1 TDD	_	1 TDD	_
TCI state		TCI.Sta	_	TCI.Sta	_	
TOTState			te.0		te.0	
			SR.3.1		SR.3.1	
PDSCH Reference m	neasurement channel		TDD	-	TDD	-
			00.01		00.01	
DMOLOODEOET D			CR.3.1		CR.3.1	
RMSI CORESET Re	rerence Channel		TDD	-	TDD	-
			OP.1	OP.1	OP.1	OP.1
OCNG Patterns			01.1	01.1	01.1	01.1
CCD configuration			SSB.3	SSB.3	SSB.3	SSB.3
SSB configuration			FR2	FR2	FR2	FR2
SMTC configuration			SMTC.	SMTC.	SMTC.	SMTC.
			1 FR2	1 FR2	1 FR2	1 FR2
PDSCH/PDCCH sub		kHz	120	120	120	120
EPRE ratio of PSS to						
EPRE ratio of PBCH						
EPRE ratio of PBCH						
EPRE ratio of PDCC		dB	0	0	0	0
EPRE ratio of PDCCH to PDCCH_DMRS		uD.		O		O
EPRE ratio of PDSCI						
EPRE ratio of PDSCI						
EPRE ratio of OCNG						
EPRE ratio of OCNG to OCNG DMRS Note						
Propagation conditions AWGN AWGN AWGN AWGN AWGN					AWGN	
Antenna configuration 1x2 1x2 1x2 1x2						
	all be used such that bo	th cells are fully	/ allocated	and a cons	stant 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:	Void		
Note 3:	Void		
Note 4:	Void		

Table A.5.7.2.2.3: SS-RSRQ Inter frequency OTA related test parameters

	Parameter	Unit	Tes	st 1	Test 2		
	i didilictoi		Cell 2	Cell 3	Cell 2	Cell 3	
AoA setu	n			in clause	Setup 1 in clause		
	•			e A.3.15		e A.3.15	
Assumpti	on for UE beams <sup>Note 8</sup>		Ro	ugh	Ro	ugh	
$N_{oc}^{}$ Note1		dBm/15kHz <sup>N</sup> ote4	-94.03	-94.03	-94.03	-94.03	
$N_{oc}^{}$ Note1		dBm/SCS <sup>Note</sup>	-85.0	-85.0	-85.0	-85.0	
$\hat{E}_s/N_{oc}$		dB	-1.75	-1.75	-3	-3	
SSB_RPNote2		dBm/SCS Note4	-86.75	-86.75	-88	-88	
SS-RSRQ <sup>Note2</sup>		dB	-14.75	-14.75	-15.56	-15.56	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-1.75	-1.75	-3	-3	
Io <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>	-53.8	-53.8	-54.25	-54.25	
Note 1:	Interference from other cells and constant over subcarriers and time						
	for $N_{oc}$ to be fulfilled.						
Note 2:	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.						ndent	
Note 4:	Equivalent power received by an	antenna with 0d	Bi gain at t	he centre	of the quie	t zone	
Note 5:	As observed with 0dBi gain anter	na at the centre	of the quie	et zone			
Note 6:							
Note 7:	Void						
Note 8:	Information about types of UE be implementation or test system im		.2.1.3, and	does not l	imit UE		

### A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

### A.5.7.3 SS-SINR

# A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

#### A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

#### A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

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.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Te	st 1	Tes	st 2
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		Fre	eq2	Fre	q2
Duplex mode		TI	DD	TE	DD
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1
BW <sub>channel</sub>	MHz	100: N	RB,c = 66	100: N <sub>F</sub>	$_{B,c} = 66$
Data RBs allocated		6	66	6	6
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				VP.1.1	
DRX cycle configuration	ms			plicable	
TRS configuration				2.1 TDD	
TCI state			TCI.S	State.0	
PDSCH Reference measurement channel		SR.3.1		SR.3.1	
1 20011 Reference medearement enarmer		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	05.4
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC.1			000.4
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1
	1.1.1-	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	ID.			_	_
EPRE ratio of PBCH_DMRS to SSS	dB	0	0	0	0
EPRE ratio of PBCH to PBCH_DMRS					

EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS				
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation conditions	۸۱۸	/GN	A1A/	'GN
	Avv	/GIN	AVV	GIN
Antenna configuration	40	40	40	40
	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: Void Note 3: Void Note 4: Void

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Test 2		
raidilletei	Onit	Cell 2	Cell 3	Cell 2	Cell 3	
Angle of arrival configuration	Setup 1  Ingle of arrival configuration  Setup 1  according to clause A.3.15.1		ding to	Setup 1 according to clause A.3.15.		
Assumption for UE beams <sup>Note 9</sup>		Ro	ugh	Ro	ugh	
$N_{oc}^{}$ Note1	dBm/15kHz Note4	-1	05	-1	05	
$N_{oc}^{ m Note1}$	dBm/SCS Note3	-9	-96		96	
$\hat{E}_s/N_{oc}$	dB	4.54	2.66	-3	-3	
SS-RSRP <sup>Note2</sup>	dBm/SCS Note4	-91.46	-93.34	-99	-99	
SS-SINR Note2	dB	0	-3.2	-4.76	-4.76	
$\hat{E}_{s}/I_{ot}$	dB	0	-3.2	-4.76	-4.76	
Io <sup>Note2</sup>	dBm/95.04 MHz Note4	59	.43	-6	64	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for  $N_{oc}$  to be fulfilled.

Note 2: SS-SINR, SSB\_RP, 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: Void Note 7: Void Note 8: Void

Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

#### A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

## 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.5.7.3.2.2-2: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Parameter	Unit	Tes	Test 1		Test 2		Test 3	
Parameter	Offic	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2	
Duplex mode		TI	DD	T	DD	TDD		
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	100: N	RB,c = 66	100: N	RB,c = 66	100: NR	$_{\rm B,c} = 66$	
Data RBs allocated		6	66	6	66	6	6	
Downlink initial BWP configuration		DLBWP.0.1						
Downlink dedicated BWP configuration				DLBV	VP.1.1			
Uplink initial BWP configuration		ULBWP.0.1						
Uplink dedicated BWP configuration		ULBWP.1.1						
DRX cycle configuration	ms			Not ap	plicable			
TRS configuration				TRS.2	.1 TDD			
TCI state				TCI.S	state.0			
		SR.3.1		SR.3.1		SR.3.1		
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-	
				00.01		00.01		
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-	
		טטו		טטו		טטו		

							1
		05.4	00.4	00.4	00.4	00.4	00.4
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.
SMTC configuration		1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2
SSB configuration		SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	SSB.3
OOD configuration		FR2	FR2	FR2	FR2	FR2	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	1						
EPRE ratio of PDCCH_DMRS to SSS	40	0	0	0	_	0	0
EPRE ratio of PDCCH to PDCCH_DMRS	dB	U	U	U	0	U	U
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>	1						
EPRE ratio of OCNG to OCNG DMRS Note	1						
1							
Propagation conditions		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Tes	st 2	Tes	st 3
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
Angle of arrival configuration	degrees	accord	up 1 ding to 15.1		up 1 ding to 15.1	accord	up 1 ding to 15.1
Assumption for UE beams <sup>Note 10</sup>		Ro	ugh	Ro	ugh	Ro	ugh
$N_{oc}^{}$ Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
$N_{oc}^{}$ Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
$\hat{E}_s/N_{oc}$	dB	-0.5	-0.5	11	11.	-3.0	-3.0
SS-RSRP <sup>Note2</sup>	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR <sup>Note2</sup>	dB	-0.5	-0.5	11	11	-3.0	-3.0
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup>	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.
Note 2:	SS-SINR, SSB_RP, 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:	Void
Note 7:	Void
Noto 9.	Void

Note 9: Void
Note 9: Void
Note 10: Information

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

#### A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

### A.5.7.4 L1-RSRP measurement for beam reporting

#### A.5.7.4.1 SSB based L1-RSRP measurement

#### A.5.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.5.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only 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), FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.5.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~4		freq1	freq1
Duplex mode	1~4		TDD	TDD
TDD Configuration	1~4		TDDConf.3.1	TDDConf.3.1
BWchannel	1~4	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~4		66	66
PDSCH Reference	1,2		SR.3.2 TDD	SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD	CR.3.1 TDD
Channel	3,4		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1,2		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD	CCR.3.7 TDD
000 " "	1,2		SSB.1 FR2	SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
Initial BWP Configuration	1~4		DLBWP.0.1	DLBWP.0.1
Initial BVVP Configuration	1~4		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3	DLBWP.1.3
			ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~4		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI	1~4		TCI.State.2	TCI.State.2
Configuration				
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		slot320	slot320
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 <sup>Note 1</sup>				
EPRE ratio of OCNG to OCNG				
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for  $N_{oc}$  to be fulfilled.

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Davamatas	0	1114	Test 1		Test 2 NOTE 3	
Parameter	Config	Unit	SSB0	SSR1	SSB0	SSR1

Angle of arrival configuration		Setup 1 according to		Setup 1 according to		
			A.3.15.1		A.3.15.1	
Assumption for UE beams <sup>Note 4</sup>			Rou	ıgh	Rough	
$N_{oc}$	1~4	dBm/15 kHz	-100		n.a.	
N	1,2	dBm/SS	-9	1	n.a.	
$N_{oc}$	3,4	B SCS	-88		n.a.	
$\hat{E}_{_{\! \mathrm{s}}}/I_{_{\! \mathrm{ot}}}$	1~4	dB	10	-2	n.a.	
SSB_RP <sup>Note1</sup>	1,2	dBm/SC	-81	-93	As in Table B.2.4-2	
SSB_RPHOLET	3,4	S	-78	-90	As in Table B.2.4-2	
Io <sup>Note1</sup>	1~4	dBm/ 95.04M Hz	-51.57		SSB_RP+28.98	
$\hat{E}_s/N_{oc}$	1~4	dB	10 -2		n.a.	

Note 1: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

#### A.5.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

#### For Test 1:

Absolute accuracy of SSB0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

#### For Test 2:

Absolute accuracy of SSB resource reported by UE in L1-RSRP report (SSB0 or SSB1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.5.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3				
	SSB0	$SSB\_RP0 - \delta + G_{min} \leqslant Reported \ RSRP(dBm) \leqslant SSB\_RP0 + \delta + G_{max}$				
	SSB1	SSB_RP1 - $\delta$ + G <sub>min</sub> $≤$ Reported RSRP(dBm) $≤$ SSB_RP1 + $\delta$ + G <sub>max</sub>				
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration					
Note 2:	t: δ is the RSRP absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the lo used in the test					
Note 3:		G <sub>min</sub> and G <sub>max</sub> are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class				

### A.5.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

#### A.5.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.5.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

#### A.5.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.5.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW <sub>channel</sub>	1~2	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 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.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
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		slot320	slot320
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				
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
EPRE ratio of OCNG to OCNG				
DMRS Note 1				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for  $N_{oc}$  to be fulfilled.

Table A.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

	Config	Unit	Tes	Test 1		Test 2 NOTE 3	
Parameter			CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1	
Angle of arrival configuration					Setup 1 acc	•	
			A.3.	15.1	A.3.1	5.1	
Assumption for UE beams <sup>Note 4</sup>			Rou	ugh	Rou	gh	
$N_{oc}$	1~2	dBm/15 kHz	-10	00	n.a	l <b>.</b>	
$N_{oc}$	1~2	dBm/SS B SCS	-91		n.a. n.a.		
$\hat{E}_{_{ m s}}/{ m I}_{_{ m ot}}$	1~2	dB	10	-2	n.a.		
CSI-RS-RSRP <sup>Note1</sup>	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2		
IoNote1	1~2	dBm/ 95.04M Hz	-59.86		SS-RSRF	°+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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.5.7.4.2.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.2. The following requirements are to be verified:

#### For Test 1:

Absolute accuracy of CSI-RS0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

#### For Test 2:

Absolute accuracy of CSI-RS resource reported by UE in L1-RSRP report (CSI-RS0 or CSI-RS1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3				
CSI-RS0		CSI-RS _RP0 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 + $\delta$ + G <sub>max</sub>				
CSI-RS1		CSI-RS _RP1 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 + $\delta$ + G <sub>max</sub>				
Note 1:	: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration					
Note 2:						
Note 3:	G <sub>min</sub> and G <sub>max</sub> are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class				

## A.5.8 Void

# A.6 NR standalone tests with all NR cells in FR1

# A.6.1 SA: RRC\_IDLE state mobility

## A.6.1.1 Cell re-selection to NR

## A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

## A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

#### A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

Cor	nfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	ote: 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		Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		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
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.2	Configured in SIB2 of Cell 1
				SMTC.6	Configured in SIB2 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2

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	8	1, 2, 3	40	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	S	1, 2, 3	15	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit Test		Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A		N/A		
		2		DDConf.1.			DDConf.1.	
		3		DDConf.2.		TDDConf.2.1		
PDSCH RMC		1		SR.1.1 FDD			R.1.1 FDI	
configuration		2		SR.1.1 TDD			R.1.1 TDI	
		3	(	SR.2.1 TDD	)	S	R.2.1 TDI	)
RMSI CORESET		1		CR.1.1 FDD			R.1.1 FDI	
RMC configuration		2		CR.1.1 TDD			R.1.1 TDI	
		3		CR.2.1 TDD			R.2.1 TDI	
Dedicated		1		CR.1.1 FD			CR.1.1 FD	
CORESET RMC		2	С	CR.1.1 TD	D	C	CR.1.1 TD	D
configuration		3		CR.2.1 TD			CR.2.1 TD	
OCNG Pattern		1, 2, 3	OP.1	defined in A	.3.2.1	OP.1 d	efined in A	٩.3.2.1
Initial DL BWP		1, 2, 3	ļ	DLBWP.0.1			LBWP.0.	1
configuration								
Initial UL BWP		1, 2, 3	I	ULBWP.0.1		ULBWP.0.1		
configuration								
RLM-RS		1, 2, 3		SSB		SSB		
Qrxlevmin	dBm/SCS	1, 2		-130		-130		
		3		-127		-127		
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		SS-RSRP		SS-RSRP		
reselection_quality_								
measurement								
Ê s /I ot	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
		2						
		3						
$N_{oc}$ Note2	dBm/SCS	1	-98					
		2	-98					
		3	-95					
$N_{oc}$ Note2	dBm/15 kHz	1	-98					
		2	1					
		3	†					
$\hat{E}_{s}/N_{oc}$	dB	1	16	13	16	-infinity	16	13
<i>a</i> ,	<del>-</del>	2	. •				. •	
I					l			l .

		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	Same	as param	eters
						specified	d in Cell 1	columns
	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		60 60			l	
Propagation Condition		1, 2, 3	AWGN					

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for  $\frac{N_{oc}}{N_{oc}}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

## A.6.1.1.1.3 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 Registration procedure for mobility and periodic registration update 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 Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as:  $T_{detect, NR\_Intra} + T_{SI-NR}$ , and to an already detected cell can be expressed as:  $T_{evaluate, NR\_intra} + T_{SI-NR}$ ,

### Where:

 $T_{detect, NR\_Intra}$  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<sub>SI-NR</sub> 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
	T		configuration		
Initial	Active cell		1, 2, 3	Cell 2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2, 3	Cell 1	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	Neighbour cell		1, 2, 3	Cell 1	with higher priority during T3
RF Channe	el Number		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
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access
	· ·				procedure.
SSB config	juration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	Configured in SIB4 of Cell 1
				SMTC.6	Configured in SIB4 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	PRACH configuration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		S	1, 2, 3	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.
ТЗ	S	1, 2, 3	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1				Cell 2	
		configuration	T1	T1 T2 T3		T1	T2	T3
TDD configuration		1	N/A			N/A		
		2		DDConf.1.		TDDConf.1.1		
		3		DDConf.2.			DDConf.2.	
PDSCH RMC		1	S	SR.1.1 FDE	)	9	SR.1.1 FDD	)
configuration		2	5	SR.1.1 TDE	)		SR.1.1 TDD	
		3		SR.2.1 TDD			SR.2.1 TDD	
RMSI CORESET		1		CR.1.1 FDE			CR.1.1 FDD	
RMC configuration		2		CR.1.1 TDE			CR.1.1 TDD	
		3		CR.2.1 TDE			CR.2.1 TDD	
Dedicated		1		CR.1.1 FD			CR.1.1 FD	
CORESET RMC		2		CR.1.1 TD			CR.1.1 TD	
configuration		3		CR.2.1 TD			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
Initial DL BWP		1, 2, 3	I	DLBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1, 2, 3	Į.	JLBWP.0.1		ULBWP.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	
Cell_selection_and_		1, 2, 3		SS-RSRP			SS-RSRP	
reselection_quality_								
measurement				1			,	
Ê s /I ot	dB	1	14	14	14	-4	-infinity	12
		2						
		3						
$N_{_{OC}}$ Note2	dBm/SCS	1			-98			
		2			-98			
		3			-95			
$N_{oc}$ Note2	dBm/15 kHz	1			-98			
		2	†					
		3						
$\hat{E}_{s}/N_{oc}$	dB	1	14 14 14 -		-4	-infinity	12	
. , 00	<del></del>	2	··   ··   ··   ··   ··		•=			
		3						
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-86
		2	-84	-84	-84	-102	-infinity	-86
		3	-81	-81	-81	-99	-infinity	-83
			•	١ .	ı			

lo	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60		-57.78
							-70.05	
	dBm/9.36 MHz	2	-55.88	-55.88	-55.88	-68.60		-57.78
							-70.05	
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50		-51.69
							-63.96	
Treselection	S	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3		50			50	
Threshx, highP	dB	1, 2, 3		48			48	
Thresh <sub>serving</sub> , lowP	dB	1, 2, 3		44			44	
Thresh <sub>x, lowP</sub>	dB	1, 2, 3		50			50	
Propagation		1, 2, 3			AWG	iN		
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.6.1.1.2.3 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 Registration procedure for mobility and periodic registration update 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 Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as:  $T_{higher\_priority\_search} + T_{evaluate, NR\_inter} + T_{SI-NR}$ , and to a lower priority cell can be expressed as:  $T_{evaluate, NR\_inter} + T_{SI-NR}$ ,

#### Where:

T<sub>higher\_priority\_search</sub> See clause 4.2.2.7

 $T_{evaluate, NR\_inter}$  See Table 4.2.2.4-1 in clause 4.2.2.4

T<sub>SI-NR</sub> Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

## A.6.1.2 Inter-RAT E-UTRAN cell re-selection

## A.6.1.2.1 Cell reselection to higher priority E-UTRAN

## A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

## A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	·
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter		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 cell		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 cell		1, 2, 3, 4, 5, 6	Cell2	during T3 for iteration of the tests.
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 PRACE	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN	PRACH configuration		1, 2, 3	53	As specified in table 5.7.1-2 in
index			4, 5, 6	4	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	S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell 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	Т3
TDD configuration		1, 4		N/A	
		2, 5	T	DDConf.1	.1
		3, 6	TI	DDConf.2	.1
PDSCH parameters		1, 4	S	R.1.1 FD	D
		2, 5		R.1.1 TD	
		3, 6	S	R.2.1 TD	D
RMSI CORESET		1, 4	С	R.1.1 FD	D
parameters		2, 5	С	R.1.1 TD	D
		3, 6	С	R.2.1 TD	D
Dedicated CORESET		1, 4	C	CR.1.1 FE	DD
parameters		2, 5	C	CR.1.1 TE	DD
		3, 6		CR.2.1 TE	
SSB parameters		1, 4		SSB.1 FR	
o o o parameters		2, 5		SB.1 FR	
		3, 6		SSB.2 FR	
NR SMTC parameters		1, 4		SMTC.2	•
Titt Citt's parameters		2, 5		SMTC.1	
		3, 6		SMTC.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		LBWP.0.	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6		JLBWP.0.	
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
QIAICVIIIII	dBill/000	3, 6		-137	
<b>.</b>	dBm/SCS	1, 4		-98	
$N_{oc}$	dbiii/000	2, 5		-98	
		3, 6		-95 -95	
<b>.</b>	dBm/15 kHz	1, 2, 3, 4, 5, 6		-98	
$N_{\!oc}$	dbiii/10 Ki iz	1, 2, 3, 4, 3, 6		30	
SS-RSRP	dBm/SCS	1, 4	-84	-84	-84
		2, 5	-84	-84	-84
		3, 6	-81	-81	-81
Ê , /I ot	dB	1, 4	14	14	14
		2, 5			
		3, 6			
$\hat{E}_s / N_{oc}$	dB	1, 4	14	14	14
		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	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6		50	
Thresh <sub>x, highP</sub> (Note 2)	dB	1, 2, 3, 4, 5, 6		48	
Thresh <sub>serving</sub> , lowP	dB	1, 2, 3, 4, 5, 6		44	
Thresh <sub>x, lowP</sub>	dB	1, 2, 3, 4, 5, 6		50	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted
	power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh<sub>x</sub>, 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 <sub>channel</sub>	MHz		10	
OCNG Patterns defined in			2 TDD for	
TS 36.133 [15] clause A.3.2			uration 1	
		_	2 FDD for	
		config	juration 4	, 5, 6
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB		0	
PHICH_RB	dB		0	
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA <sup>Note 1</sup>	dB			
OCNG_RBNote 1	dB			
Qrxlevmin	dBm		-140	
$N_{\!oc}$	dBm/15 kHz		-98	
RSRP	dBm/15 KHz	-infinity	-86	-102
Ê s /I ot	dB	-infinity	12	-4
$\hat{E}_s/N_{oc}$	dB	-infinity	12	-4
Treselection <sub>EUTRAN</sub>	S		0	
SnonintrasearchP	dB	Not sent		
Thresh <sub>x, highP</sub>	dB	48		
Thresh <sub>serving, lowP</sub>	dB	44		
Thresh <sub>x, lowP (Note 2)</sub>	dB	50		
Propagation Condition		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh<sub>x, Low</sub> which is included in E-UTRA system information, and is a threshold for the NR target

## 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<sub>evaluate, E-UTRAN</sub> See Table 4.2.2.5-1 in clause 4.2.2.5

T<sub>SI-E-UTRA</sub> 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 two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	phase.
T1 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		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 cell		1, 2, 3, 4, 5, 6	Cell2	during T2 for iteration of the tests.
Access Barring Information		-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	length	s	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.

NR PRACH configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration index		1, 2, 3 4, 5, 6	53 4	As specified in table 5.7.1-2 in TS 36.211 [23]
T1	S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell reselection reaction time is taken into account.
T2	S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell	1
			T1	T2
TDD configuration		1, 4	N/A	
		2, 5	TDDCo	
		3, 6	TDDCo	
PDSCH RMC configuration		1, 4	SR.1.1 FDD	
		2, 5	SR.1.1	TDD
		3, 6	SR.2.1	
RMSI CORESET RMC		1, 4	CR.1.1	
configuration		2, 5	CR.1.1	
		3, 6	CR.2.1	
Dedicated CORESET RMC		1, 4	CCR.1.1	
configuration		2, 5	CCR.1.1	
		3, 6	CCR.2.1	TDD
SSB configuration		1, 4	SSB.1	
-		2, 5	SSB.1	
		3, 6	SSB.2	
SMTC configuration		1, 4	SMT	C.2
		2, 5	SMT	
		3, 6	SMT	C.1
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined	l in A.3.2.1
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWI	P.0.1
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWI	P.0.1
RLM-RS		1, 2, 3, 4, 5, 6	SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-14	0
		3, 6	-13	7
$N_{oc}$	dBm/SCS	1, 4	-98	3
$i\mathbf{v}_{oc}$		2, 5	-98	3
		3, 6	-95	5
$N_{oc}$	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	3
SS-RSRP	dBm/SCS	1, 4	-102	-86
		2, 5	-102	-86
		3, 6	-99	-83
Ê , /I ot	dB	1, 4	-4	12
		2, 5		
		3, 6		
$\hat{E}_{s}/N_{oc}$	dB	1, 4	-4	12
		2, 5		
		3, 6		
lo	dBm/9.36 MHz	1, 4	-68.60	-57.78
	dBm/9.36 MHz	2, 5	-68.60	-57.78
	dBm/38.16 MHz	3, 6	-62.50	-51.69
Treselection	S	1, 2, 3, 4, 5, 6	0	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	Not s	ent

Thresh <sub>x, highP</sub>	dB	1, 2, 3, 4, 5, 6	48
Thresh <sub>serving, lowP</sub>	dB	1, 2, 3, 4, 5, 6	44
Thresh <sub>x, lowP</sub> (Note 2)	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<sub>x, Low</sub> 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	
E-UTRA RF Channel			1	
number				
BWchannel	MHz		10	
OCNG Patterns defined in		OP.2 TE	D for test	
TS 36.133 [15] clause A.3.2			tion 1, 2, 3;	
			DD for test	
		configura	tion 4, 5, 6	
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB		•	
PHICH_RB	dB	0		
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA <sup>Note 1</sup>	dB			
OCNG_RB <sup>Note 1</sup>	dB			
Qrxlevmin	dBm	-1	140	
$N_{oc}$	dBm/15 kHz	-	98	
RSRP	dBm/15 KHz	-84	-84	
Ê , /I ot	dB	14	14	
$\hat{E}_s / N_{oc}$	dB	14	14	
Treselection <sub>EUTRAN</sub>	S	0		
SnonintrasearchP	dB	Not	sent	
Thresh <sub>x, highP</sub> (Note 2)	dB	4	48	
Thresh <sub>serving, lowP</sub>	dB	-	14	
Thresh <sub>x, lowP</sub>	dB	į.	50	
Propagation Condition		AV	VGN	
Note 1: OCNG shall be use	d such that both	cells are fully	allocated	
and a constant total transmitted power spectral density is				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh<sub>x, high</sub> which is included in E-UTRA system information, and is a threshold for the NR target cell

## A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: T<sub>evaluate, E-UTRAN</sub> + T<sub>SI-E-UTRAN</sub>,

#### Where:

T<sub>evaluate, E-UTRAN</sub> See Table 4.2.2.5-1 in clause 4.2.2.5

 $T_{SI\text{-}E\text{-}UTRA}$  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

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 Information	-	Not Sent	No additional delays in random access procedure.
Time offset between 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		Cell 1			Cell 2	_	
		-	T1	T2	Т3	T1	T2	<u>L</u>	Т3
NR RF Channel Number				1			1		
Duplex mode	Config 1								
-	Config 2,3								
TDD	Config 1								
TDD configuration	Config 2								
	Config 3								
DIA	Config 1	NAL 1-			10: NRI	3,c = 52			
BW <sub>channel</sub>	Config 2	MHz							
	Config 3								
DIA/D DIA/	Config 1	NAL 1-			10: NRI	$_{3,c} = 52$			
BWP BW	Config 2	MHz							
DD 0 1	Config 3		FDD TDD Not Applicable TDDConf.1.1 TDDConf.2.1 10: N <sub>RB,c</sub> = 52 10: N <sub>RB,c</sub> = 52 40: N <sub>RB,c</sub> = 52 10: N <sub>RB,c</sub> = 52 40: N <sub>RB,c</sub> = 52 40: N <sub>RB,c</sub> = 52 40: N <sub>RB,c</sub> = 106 Not Applicable SR.1.1 FDD SR.1.1 FDD SR.1.1 TDD CR.1.1 FDD CR.1.1 FDD CR.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD OP.1 SMTC.1 SSB.1 FR1 SSB.2 FR1 15 kHz 30 kHz 15 kHz 30 kHz FR1 PRACH configuration 1 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1						
DRx Cycle	I o	ms							
PDSCH Reference	Config 1								
measurement channel	Config 2								
	Config 3								
CORESET Reference	Config 1								
Channel	Config 2								
	Config 3								
TDO and financial	Config 1								
TRS configuration	Config 2								
OCNG Patterns	Config 3								
SMTC Configuration									
SWITC Configuration	Config 1,2								
SSB Configuration	Config 1,2								
PDSCH/PDCCH	Config 1,2								
subcarrier spacing	Config 3	kHz							
PUCCH/PUSCH	Config 1,2								
subcarrier spacing	Config 1,2	kHz							
PRACH configuration	Corning 3			ED1			on 1		
BWP configuration	Initial DL BWP			FKI			OII I		
BWF configuration	Dedicated DL								
	BWP				DLDW	/F.I.I			
	Initial UL BWP				ΠΙΡΙΛ	/P ∩ 1			
	Dedicated UL								
	BWP				OLDV	/1 .1.1			
EPRE ratio of PSS to SS									
EPRE ratio of PBCH DM									
EPRE ratio of PBCH to F									
EPRE ratio of PDCCH D		dB			(	)			
EPRE ratio of PDCCH to									
EPRE ratio of PDSCH D									
EPRE ratio of PDSCH to	PDSCH								

	o of OCNG DMRS to SSS(Note 1) o of OCNG to OCNG DMRS (Note								
Note2		dBm/15kH z	-98						
Note2	Config 1,2				-6	98			
N <sub>oc</sub>	Config 3	dBm/SCS			-6	95			
Ê , /I ot		dB	8	-3.3	-3.3	- Infinity	2.36	2.36	
$\hat{E}_{s}/N_{oc}$		dB	8	8	8	- Infinity	- 11 1		
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	- Infinity	-87	-87	
SSB_KF	Config 3	dBm/SCS	-87	-87	-87	- Infinity	-84	-84	
IoNote3	Config 1,2	dBm/ 9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06	
10.13.00	Config 3	dBm/ 38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96	
Propagation	on condition	-		AWGN			AWGN		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{max}$  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 72 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<sub>interrupt</sub>, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 62$  ms in the test.  $T_{interrupt}$  is defined in clause 6.1.1.2.2.

This gives a total of 72 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 cells on one 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	
Access Barring Inf	formation	-	Not Sent	No additional delays in random access procedure.
Time offset between	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		l lm:t	C	ell 1	Cell 2		
Parame	eter	Unit	T1	T2	T1	T2	
NR RF Channel Number	ſ			1	1		
Dunley made	Config 1			FD	DD		
Duplex mode	Config 2,3				_		
	Config 1			Not App	olicable		
TDD configuration	Config 2						
	Config 3	$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $					
	Config 1						
BWchannel	Config 2	MHz		10: N <sub>RE</sub>	s,c = 52		
	Config 3			T1 T2 T1 T2  1 1 1  FDD  TDD  Not Applicable  TDDConf.1.1  TDDConf. 2.1  10: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 106  10: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 106  Not Applicable  SR.1.1 FDD  SR.1.1 TDD  SR2.1 TDD			
	Config 1			10: N <sub>RE</sub>	s,c = 52		
BWP BW	Config 2	MHz	10: N <sub>RB,c</sub> = 52				
	Config 3	3 40: N		40: N <sub>RB</sub>	B,c = 106		
DRx Cycle		ms					
PDSCH Reference measurement channel	Config 1		SR.1.1 FDD				
measurement channel			10: N <sub>RB,c</sub> = 52 40: N <sub>RB,c</sub> = 106 Not Applicable SR.1.1 FDD SR.1.1 TDD SR2.1 TDD CR.1.1 FDD CR.1.1 FDD CR.2.1 TDD				
CORESET Reference							
Channel	Config 3			CR.1.	1 TDD		
Charmer	Config 3						
TRS configuration	Config 2						
	Config 3			T2 T1 T1  FDD  TDD  Not Applicable  TDDConf. 1.1  TDDConf. 2.1  10: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 52  10: N <sub>RB,c</sub> = 106  Not Applicable  SR.1.1 FDD  SR.1.1 TDD  SR.1.1 TDD  CR.1.1 FDD  CR.1.1 TDD  CR.1.1 TDD  TRS.1.1 FDD  TRS.1.1 FDD  TRS.1.1 TDD  TRS.1.1 TDD  TRS.1.1 TDD  TRS.1.1 TDD  SRD  TRS.1.1 TDD  TRS.1.1 TDD  TRS.1.1 TDD  TRS.1.1 TDD  TRS.1.1 FDD  TRS.1.1 FDD  TRS.1.1 TDD			
OCNG Patterns							
SMTC Configuration							
SSB Configuration	Config 1,2			SSB.1 FR1			
	Config 3						
PDSCH/PDCCH	Config 1,2	kHz	15 kHz				
subcarrier spacing	Config 3	NI IZ					
PUCCH/PUSCH	Config 1,2	kHz	15 kHz				
subcarrier spacing	Config 3	NI IZ	30 kHz				

PRACH configuration		FR1 PRACH configuration 1					
	Initial DL BWP			DLBW	/P.0.1		
	Dedicated DL			DLBW	/P.1.1		
BWP configuration	BWP						
BWI configuration	Initial UL BWP			ULBW	_		
	Dedicated UL			ULBW	/P.1.1		
	BWP						
EPRE ratio of PSS to S							
EPRE ratio of PBCH DI							
EPRE ratio of PBCH to							
EPRE ratio of PDCCH I							
EPRE ratio of PDCCH t		dB	0				
EPRE ratio of PDSCH I							
EPRE ratio of PDSCH t							
EPRE ratio of OCNG D		1					
EPRE ratio of OCNG to	OCING DIVIRS (Note						
1)		dBm/15kH					
Note2		Z Z		-9	98		
Note2 Config 1,2				-9	98		
N <sub>oc</sub> Config 3		dBm/SCS		-9	95		
Ê s /I ot		dB	8	-0.64	-Infinity	-0.64	
$\hat{E}_{s}/N_{oc}$		dB	8	8	-Infinity	8	
SSB_RP Config 1,2		dBm/SCS	-90	-90	-Infinity	-90	
Config 3		dBm/SCS	-87	-87	-Infinity	-87	
Config 1,2		dBm/ 9.36MHz	-61.41	-58.71	-61.41	-58.71	
Io <sup>Note3</sup> Config 3		dBm/ 38.16MHz	-55.31	-52.60	-55.31	-52.60	
Propagation condition		-	AW		AW		
	be used such that both		allocated and a	a constant total	transmitted po	ower 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.
- lo levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

#### A.6.3.1.2.3 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 92 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<sub>interrupt</sub>, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 82$  ms in the test.  $T_{interrupt}$  is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

#### Inter-frequency handover from FR1 to FR1; unknown target cell A.6.3.1.3

#### 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

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring In	Access Barring Information		Not Sent	No additional delays in random access procedure.
T1		S	5	
T2		S	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Param	c mode         Config 1           Config 2,3         Config 1	Unit	C	ell 1	Ce	II 2	
Param	eter	Unit	T1	T2	T1	T2	
NR RF Channel Numbe	•			1	2	2	
Duplay mada	Config 1			F	DD		
Duplex mode	Config 2,3			T	)D		
	Config 1			Not Ap	olicable		
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDC	onf.2.1		
	Config 1	Infig 1         Not Applica           Infig 2         TDDConf.1           Infig 3         TDDConf.2           Infig 1         10: N <sub>RB,c</sub> =           Infig 2         MHz           Infig 3         40: N <sub>RB,c</sub> =           Infig 1         10: N <sub>RB,c</sub> =           Infig 2         MHz           Infig 3         40: N <sub>RB,c</sub> =           Infig 3         40: N <sub>RB,c</sub> =	s,c = 52				
BW <sub>channel</sub>	Config 2	MHz		10: N <sub>R</sub>	<sub>B,c</sub> = 52		
	Config 3			40: N <sub>RB</sub>	,c = 106		
	Config 1		10: N <sub>RB,c</sub> = 52				
BWP BW	Config 2	MHz		10: N <sub>RI</sub>	s,c = 52		
	Config 3			40: N <sub>RB</sub>	,c = 106		
	Config 1			TRS.1.	1 FDD		
TRS configuration	Config 2			TRS.1.	1 TDD		
	Config 3			TRS.1.	2 TDD		
DRx Cycle		ms		Not App	olicable		
PDSCH Reference	Config 1			SR.1.	1 FDD		
measurement channel	Config 2			SR.1.	1 TDD		
measurement channel	Config 3	TDD  TDD  Not Applicable  TDDConf.1.1  TDDConf.2.1  10: N <sub>RB,c</sub> = 52  MHz  MHz  MHz  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 106  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 52  TDDConf.2.1  10: N <sub>RB,c</sub> = 52  40: N <sub>RB,c</sub> = 106  TRS.1.1 FDD  TRS.1.1 TDD  TRS.1.2 TDD					
	Config 1			CR.1.	1 FDD		

CORESET R	Reference	Config 2			CR.1.	1 TDD		
Channel Config 3					CR2.	1 TDD		
OCNG Patterns					OF	P.1		
SMTC Config	guration							
SSB Configu	rotion	Config 1,2			SSB.	1 FR1		
		Config 3			SSB.2	2 FR1		
PDSCH/PDC	CH	Config 1,2	kHz		15	kHz		
subcarrier sp	acing	Config 3	KHZ		30	kHz		
PUCCH/PUS		Config 1,2	kHz			kHz		
subcarrier sp		Config 3	NI IZ			kHz		
PRACH conf	iguration				FR1 PRACH			
		Initial DL BWP			DLBV			
DWD		Dedicated DL BWP			DLBW	/P.1.1		
BWP		Initial UL BWP			ULBV	/P.0.1		
		Dedicated UL			ULBV	/P.1.1		
		BWP						
EPRE ratio o	of PSS to SS	SS						
EPRE ratio o	of PBCH DIV	IRS to SSS						
EPRE ratio o	of PBCH to F	PBCH DMRS						
		MRS to SSS						
EPRE ratio o	of PDCCH to	PDCCH DMRS	dB	3 0				
EPRE ratio o			ub l	U				
EPRE ratio o								
		MRS to SSS(Note 1)						
	of OCNG to	OCNG DMRS (Note						
1)						T		
$N_{oc}$ Note2			dBm/15kH z	-6	98	-(	98	
Note2 (	Config 1,2			-9	98	-(	98	
Note2	Config 3		dBm/SCS	-6	95	-(	95	
Ê , /I ot			dB	4	4	-Infinity	5	
$\hat{E}_{s}/N_{oc}$			dB	4	4	-Infinity	5	
	Config 1,2		dBm/SCS	-94	-94	-Infinity	-93	
SSB_KP (	Config 3		dBm/SCS	-91	-91	-Infinity	-90	
IoNote3	Config 1,2		dBm/ 9.36MHz	-64.59	-64.59	-70.05	-63.85	
	Config 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75	
Propagation	condition		-	AW	'GN	AW	'GN	
		e used such that both	cells are fully	allocated and a	a constant total	transmitted no	ower spectral	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{N_{out}}$  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 132 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<sub>interrupt</sub>, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 122 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.2.2.$ 

This gives a total of 132 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 next instant after the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel N	lumber		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measure	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-Threshold2EU1	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 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 9.1.2-1 started before T2 starts
T1	S	5	
T2	S	≤5	
T3	S	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit	Configuration		Cell 1	
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4		FDD	
		2, 3, 5, 6	TDD		
TDD Configuration		2, 5	TDDConf.1.1		
		3, 6		TDDConf.2.1	
BW <sub>channel</sub>	MHz	1, 4	10: N <sub>RB,c</sub> = 52 (FDD)		
		2, 5		$N_{RB,c} = 52$ (TI	
		3, 6	40:	$N_{RB,c} = 106 (T$	DD)
PDSCH reference measurement		1, 4		SR.1.1 FDD	
channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
TRS configuration		1, 4		TRS.1.1 FDD	
		2, 5		TRS.1.1 TDD	
		3, 6		TRS.1.2 TDD	
OCNG pattern <sup>Note1</sup>		1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP	1, 2, 3, 4, 5, 6		DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL BWP			ULBWP.1.1	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
-		3, 6		SSB.2 FR1	
b2-Threshold1	dBm	1, 2, 4, 5		-96	
		3, 6		-93	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		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_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
NocNote2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-100	-104	-100
	dBm/SCS	1, 2, 4, 5	-100	-104	-100
N <sub>oc</sub> Note2	42/000	3, 6	-97	-101	-97
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	12	0	0
Ê <sub>s</sub> /I <sub>ot</sub> Note3	dB	1, 2, 3, 4, 5, 6	12	0	0
-5/101	, J	., 2, 0, 7, 0, 0	14		

SS-RSRP <sup>Note3</sup>	dBm/SCS	1, 2, 4, 5	-88	-104	-104
		3, 6	-85	-101	-101
Io <sup>Note3</sup>	dBm/9.36 MHz	1, 2, 4, 5	-59.78	-73.04	-69.04
	dBm/38.16 MHz	3, 6	-53.68	-66.9448	-64.19
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2 Low	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RSRP, and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2		
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		2	
Duplex mode		1, 2, 3	FDD		
		4, 5, 6		TDD	
TDD special subframe configuration <sup>Note1</sup>		4, 5, 6		6	
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6		1	
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6		5 MHz: N <sub>RB,c</sub> = 25 10 MHz: N <sub>RB,c</sub> = 50 20 MHz: N <sub>RB,c</sub> = 100	
PRACH		1, 2, 3		4	
ConfigurationNote2		4, 5, 6		53	
PDSCH parameters:		1, 2, 3		5 MHz: R.7 FDD	
DL Reference				10 MHz: R.3 FDD	
Measurement				20 MHz: R.6 FDD	
Channel <sup>Note3</sup>		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				20 MHz: R.10 FDD	
Measurement		4, 5, 6		5 MHz: R.11 TDD	
Channel <sup>Note3</sup>				10 MHz: R.6 TDD	
OCNG Patterns <sup>Note3</sup>		1.0.0		20 MHz: R.10 TDD	
OCNG Patterns 1000		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	
		4, 5, 6		10 MHz: OP.1 TDD	
				20 MHz: OP.7 TDD	
PBCH_RA		1, 2, 3, 4, 5, 6		20 1111 121 01 11 100	
PBCH_RB		1, 2, 3, ., 3, 0			
PSS_RA					
SSS_RA				•	
PCFICH_RB	dB			0	
PHICH_RA					
PHICH_RB					
PDCCH_RA					

PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA <sup>Note4</sup>					
OCNG_RB <sup>Note4</sup>					
N <sub>oc</sub> Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	-Infinity	8	78
Ês/IotNote6	dB	1, 2, 3, 4, 5, 6	-Infinity	78	78
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
SCH_RP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
IoNote6	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21	-58.57	-58.57
10			+10log(N <sub>RB,c</sub> /100)	+10log(N <sub>RB,c</sub> /100)	+10log(N <sub>RB,c</sub> /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 N₀c to be fulfilled.
- Note 6: Ês/Iot, 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.6.3.1.4.2 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

Pai	rameter	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)

Para	meter	Unit	Configuration	С	ell 1
			_	T1	T2
RF channel numb	per		1, 2, 3, 4, 5, 6		1
Duplex mode			1, 4	F	DD
			2, 3, 5, 6	T	DD
TDD Configuration	n		2, 5	TDD0	Conf.1.1
			3, 6	TDD	Conf.2.1
BW <sub>channel</sub>		MHz	1, 4	10: N <sub>RB,c</sub>	= 52 (FDD)
			2, 5	10: N <sub>RB,c</sub>	= 52 (TDD)
			3, 6	40: N <sub>RB,c</sub> :	= 106 (TDD)
PDSCH reference	e measurement		1, 4	SR.1	.1 FDD
channel			2, 5	SR.1	.1 TDD
			3, 6	SR.2	.1 TDD
CORSET referen	ce channel		1, 4	CR.1	.1 FDD
			2, 5	CR.1	.1 TDD
			3, 6	CR.2	2.1 TDD
TRS configuration	n		1, 4	TRS.	1.1 FDD
			2, 5	TRS.	1.1 TDD
			3, 6	TRS.1.2 TDD	
OCNG pattern <sup>Note1</sup>			1, 2, 3, 4, 5, 6	C	)P.1
	Initial DL BWP		1, 2, 3, 4, 5, 6	DLB	WP.0.1
BWP	Dedicated DL BWP			DLB	WP.1.1

	Initial UL BWP			ULBV	VP.0.1	
	Dedicated UL BWP			ULBV	VP.1.1	
SMTC configurat	ion		1, 2, 3, 4, 5, 6	SM	TC.1	
SSB configuration			1, 2, 4, 5	SSB.	1 FR1	
_	Ü		3, 6	SSB.	2 FR1	
EPRE ratio of PS	SS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PB SSS	SCH_DMRS to					
EPRE ratio of PB PBCH_DMRS	BCH to					
EPRE ratio of PD	OCCH_DMRS to	1				
EPRE ratio of PD PDCCH_DMRS	OCCH to	dB			0	
EPRE ratio of PD SSS	EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PD PDSCH_DMRS	SCH to					
EPRE ratio of OC SSS	CNG DMRS to					
EPRE ratio of OC DMRS	CNG to OCNG					
N <sub>oc</sub> Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6	-(	98	
Noc <sup>Note2</sup>		dBm/SCS	1, 2, 4, 5	-(	98	
33			3, 6	-(	95	
Ês/Noc		dB	1, 2, 3, 4, 5, 6	0	0	
Ês/Iot <sup>Note3</sup>		dB	1, 2, 3, 4, 5, 6	0	0	
SS-RSRP <sup>Note3</sup>		dBm/SCS	1, 2, 4, 5	-98	-98	
			3, 6	-95	-95	
Io <sup>Note3</sup>		dBm/9.36 MHz	1, 2, 4, 5	-67.04	-67.04	
10		dBm/38.16 MHz	3, 6	-60.94	-60.94	
Propagation cond	dition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configu Correlation Matrix	ration and		1, 2, 3, 4, 5, 6	1x2	Low	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.5-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6		2
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TI	DD
TDD special subframe configuration <sup>Note1</sup>		4, 5, 6	6	
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6	1	
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub> = 25 10 MHz: N <sub>RB,c</sub> = 50	

			20 MHz: N	$I_{RB,c} = 100$			
PRACH Configuration <sup>Note2</sup>		1, 2, 3		1			
		4, 5, 6	5	3			
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD				
DL Reference Measurement		., _, -		R.3 FDD			
Channel <sup>Note3</sup>				R.6 FDD			
		4, 5, 6	5 MHz: I	R.4 TDD			
		, -, -		R.0 TDD			
				R.3 TDD			
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: F	R.11 FDD			
parameters:		, ,	10 MHz:	R.6 FDD			
DL Reference Measurement			20 MHz: I	R.10 FDD			
Channel <sup>Note3</sup>		4, 5, 6	5 MHz: F	R.11 TDD			
		, ,	10 MHz:	R.6 TDD			
			20 MHz: I	R.10 TDD			
OCNG Patterns <sup>Note3</sup>		1, 2, 3	5 MHz: O	P.20 FDD			
		, ,	10 MHz: C	P.10 FDD			
			20 MHz: C	P.17 FDD			
		4, 5, 6	5 MHz: C	P.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			)			
PDCCH_RA							
PDCCH_RB							
PDSCH_RA							
PDSCH_RB							
OCNG_RA <sup>Note4</sup>							
OCNG RB <sup>Note4</sup>							
N <sub>oc</sub> Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-98				
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
Ê <sub>s</sub> /I <sub>ot</sub> Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91			
SCH_RP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91			
Io <sup>Note6</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43			
Propagation Condition		1, 2, 3, 4, 5, 6	AW				
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6	1x2 Low				

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 6:  $\hat{E}_s/I_{ot}$ , RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in 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<sub>interrupt</sub>, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 115 \text{ ms in the test; } T_{interrupt} \text{ is defined in clause 6.1.2.1.}$ 

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

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:						

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	Value	Comment
Initial	Active cell		configuration 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	0	Radio link failure timer;
T311		ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration			1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	

		2	SMTC.1	
		3	SMTC.1	
DRX cycle length	S	1, 2, 3	OFF	
PRACH configuration		1, 2, 3	FR1 PRACH configurati on 1	Table A.3.8.2.1-1
T1	s	1, 2, 3	5	
T2	ms	1, 2, 3	200	Time for the UE to detect RLF
T3	S	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A	•		N/A	•
-		2	Т	DDConf.1.	1	Т	DDConf.1.	.1
		3	Т	DDConf.2.	1	Т	DDConf.2.	.1
PDSCH RMC		1	5	R.1.1 FDD	)		SR.1.1 FDI	)
configuration								
_		2		R.1.1 TDD			SR.1.1 TDI	
		3	5	R.2.1 TDD	)	9	SR.2.1 TDI	)
RMSI CORESET		1		R.1.1 FDD	)	(	CR.1.1 FDI	)
RMC configuration		2		R.1.1 TDD	)	(	CR.1.1 TDI	)
		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		CR.1.1 TDI			CR.1.1 TD	
-		3		CR.2.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3	OP.1 c	defined in A	.3.2.1		defined in /	
TRS configuration		1		RS.1.1 FDI			RS.1.1 FD	
· ·		2		RS.1.1 TDI			RS.1.1 TD	
		3		RS.1.2 TDI		TRS.1.2 TDD		
Initial DL BWP		1, 2, 3	DLBWP.0.1			DLBWP.0.1		
configuration		, ,	222					
Initial UL BWP		1, 2, 3	ULBWP.0.1			ULBWP.0.1		
configuration		, ,						
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB		SSB		
Ê s /I ot	dB	1	1.54	-infinity	-infinity	-3.79	4	4
		2						
		3						
$N_{oc}$ Note2	dBm/SCS	1			-98			
TV <sub>oc</sub> Noise		2			-98			
		3	-95					
Note2	dBm/15 kHz	1			-98			
$N_{oc}$ Note2		2						
		3						
$\hat{E}_{s}/N_{oc}$	dB	1	7	-infinity	-infinity	4	4	4
		2						
		3	1					
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94
		2	-91	-infinity	-infinity	-94	-94	-94
		3	-88	-infinity	-infinity	-91	-91	-91
lo	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/9.36 MHz	2	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59

		dBm/38.16 MHz	3	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation 1, 2, 3 AWGN									
Condition	1								
Note 1:	OCNG shall	be used such that both	n cells are fully allo	ocated and a	constant t	otal transm	itted powe	r spectral o	density
		or all OFDM symbols.							
Note 2:	Interference	from other cells and no	oise sources not s	pecified in th	e test is as	sumed to b	e constan	t over subo	carriers
		N							
	and time and shall be modelled as AWGN of appropriate power for 1 to be fulfilled.								
Note 3:	SS-RSRP le	vels have been derived	d from other paran	neters for inf	ormation p	urposes. Th	ney are no	t settable	

## A.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

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

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

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$
 
$$N_{freq} = 1$$

 $T_{identify\_intra\_NR} = 200 \ ms$ 

 $T_{SI}$  = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T<sub>PRACH</sub> = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

## A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

## A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
---------------	-----------------------------	----------------------------

1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD				
	duplex mode	duplex mode				
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD				
	duplex mode	duplex mode				
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD				
	duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

l	Parameter		Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1, 2	
Time offset	between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3 1, 2, 3	5000	RRC re-establishment timer
Access Bar	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle		S	1, 2, 3	OFF	
PRACH co	nfiguration		1, 2, 3	FR1	Table A.3.8.2.1-1
				PRACH	
				configurati	
				on 1	
T1		S	1, 2, 3	5	T' ( () 115 ( 1 ( 1 D) 5
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	5	

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
RF Channel Number		1, 2, 3		1		2		
TDD configuration		1	N/A			N/A		
		2	TDDConf.1.1			TDDConf.1.1		
		3	-	TDDConf.2.	1	Т	DDConf.2.	1
PDSCH RMC configuration		1		SR.1.1 FDD	)	SR.1.1 FDD		
-		2		SR.1.1 TDD			SR.1.1 TDE	)
		3		SR.2.1 TDD	1	SR.2.1 TDD		

RMSI CORESET		1	Τ (	CR.1.1 FDC	)		CR.1.1 FD	)
RMC configuration		2		CR.1.1 TDD			R.1.1 TDI	
		3		CR.2.1 TDD		CR.2.1 TDD		
Dedicated CORESET		1		CR.1.1 FDI		CCR.1.1 FDD		
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
		3		CR.2.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
TRS configuration		1		RS.1.1 FDI			RS.1.1 FD	
3		2		RS.1.1 TDI			RS.1.1 TD	
		3		RS.1.2 TDI			RS.1.2 TD	
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		, ,						
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	
Ê s /I ot	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
$N_{oc}$ Note2	dBm/SCS	1			-98			
1 V oc		2			-98			
		3			-95			
$N_{oc}$ Note2	dBm/15 kHz	1			-98			
1 voc		2						
		3						
$\hat{E}_{s}/N_{oc}$	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91
		2	-94	-infinity	-infinity	-infinity	-infinity	-91
		3	-91	-infinity	-infinity	-infinity	-infinity	-88
lo	dBm/9.36 MHz	1	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/9.36 MHz	2	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation Condition		1, 2, 3			AWG	iN		

Note 2: Interference from other cells and noise sources not specified in the test is 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.

$$T_{UE\_re-establish\_delay} = 50 \; ms + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$ 

 $T_{identify\ intra\ NR} = 800\ ms$ 

 $T_{identify\_inter\_NR} = 800 \ ms$ 

 $T_{SI} = 1280$  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<sub>PRACH</sub> = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

## A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

## A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

Co	onfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:						

Table A.6.3.2.1.3.1-2: 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	RF Channel Number		1, 2, 3	1	
Time offset between cells			1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers

N311	-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310	ms	1, 2, 3	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311	ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
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	
DRX cycle length	S	1, 2, 3	OFF	
PRACH configuration		1, 2, 3	FR1	Table A.3.8.2.1-1
			PRACH	
			configurati	
			on 1	
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	Т3	T1	T2	Т3	
TDD configuration		1	N/A		N/A				
		2	TDDConf.1.1 TDDConf.2.1			Т	DDConf.1.	1	
		3				Т	DDConf.2.	1	
PDSCH RMC configuration		1	SR.1.1 FDD		SR.1.1 FDD				
_		2		R.1.1 TDD			SR.1.1 TDD		
		3	SR.2.1 TDD		SR.2.1 TDD				
RMSI CORESET		1	C	R.1.1 FDD	)		R.1.1 FDD	)	
RMC configuration		2	CR.1.1 TDD				R.1.1 TDD	)	
		3	CR.2.1 TDD		CR.2.1 TDD				
Dedicated CORESET		1	C	CR.1.1 FDI	D	CCR.1.1 FDD			
RMC configuration		2	CCR.1.1 TDD		CCR.1.1 TDD				
		3	CCR.2.1 TDD			CCR.2.1 TDD			
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1				
TRS Configuration		1	TRS.1.1.FDD			TRS.1.1.FDD			
		2	TRS.1.1.TDD			TRS.1.1.TDD			
		3	TRS.1.2.TDD			TRS.1.2.TDD			
Initial DL BWP configuration		1, 2, 3	DLBWP.0.1		DLBWP.0.1				
Initial UL BWP configuration		1, 2, 3	ULBWP.0.1		ULBWP.0.1				
RLM-RS		1, 2, 3	SSB		SSB				
Ê s /I ot	dB	1	4 -infinity -infinity		-infinity	-infinity	4		
		2		1		-			
		3							
M Note?	dBm/SCS	1	-98 -98						
$N_{oc}$ Note2		2							
		3	-95						
Note?	dBm/15 kHz	1	-98						
$N_{oc}$ Note2		2	7						
		3							
	dB	1	4	-infinity	-infinity	-infinity	-infinity	4	

$\hat{E}_{s}/N_{oc}$		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-94
		2	-94	-infinity	-infinity	-infinity	-infinity	-94
		3	-91	-infinity	-infinity	-infinity	-infinity	-91
lo	dBm/9.36 MHz	1	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-58.50
Propagation		1, 2, 3			AWG	N		
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.6.3.2.1.3.2 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<sub>PRACH</sub> = 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 capable 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	equired to be tested in one of the supported test configurations depending on UE				

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter		Unit	Test-1	Comments		
SSB Configuration	Config 1		SSB pattern 1 in FR1	As defined in A.3.10,		
	Config 2		SSB pattern 2 in FR1	except for number of		
			·	SSBs per SS-burst and		
				SS/PBCH block index as		
				below		
Number of SSBs per SS	-burst		2	Different from the		
				definition in A.3.10		
SS/PBCH block index			0,1	Different from the		
	1			definition in A.3.10		
Duplex Mode for Cell 1	Config 1		FDD			
	Config 2		TDD			
TDD Configuration	Config 2		TDDConf.2.1			
CSI-RS for tracking	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.2 TDD			
OCNG Pattern Note 1			OP.1	As defined in A.3.2.1.		
PDSCH parameters	Config 1		SR.1.1 FDD	As defined in A.3.1.1.		
11010 4	Config 2		SR.2.1 TDD			
RMSI CORESET	Config 1		CR.1.1 FDD			
Reference Channel						
	Config 2		CR.2.1 TDD			
Dedicated CORESET	Config 1		CCR.1.1 FDD			
Reference Channel						
	Config 2		CCR.2.1 TDD			
NR RF Channel Number	ſ		1			
EPRE ratio of PSS to SS	SS	dB				
EPRE ratio of PBCH_DN	MRS to SSS	dB				
EPRE ratio of PBCH to F	PBCH_DMRS	dB	0			
EPRE ratio of PDCCH_0		dB	] "			
EPRE ratio of PDCCH to	PDCCH_DMRS	dB				
EPRE ratio of PDSCH_D	OMRS to SSS	dB				

EPRE ratio	of PDSCH t	o PDSCH_DMRS	dB		
	$\hat{E}_{s}/I_{ot}$	$\hat{E}_{s}/I_{ot}$		3	Power of SSB with index
SSB with	$N_{oc}$	Config 1	dBm/15kHz	-98	0 is set to be above
index 0	1 'oc	Config 2		-101	configured rsrp- ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	77110011011002
	SS-RSF	P Note 3	dBm/ SCS	-95	
	$\hat{E}_{s}/I_{ot}$		dB	-17	Power of SSB with index
SSB with	$N_{oc}$	Config 1	dBm/15kHz	-98	1 is set to be below
index 1	1 oc	Config 2		-101	configured rsrp- ThresholdSSB
	$\hat{E}_s/N_{oc}$	•	dB	-17	Timediferded
	SS-RSF	P Note 3	dBm/ SCS	-115	
lo Note 2		Config 1	dBm	-65.3/9.36MHz	For symbols without SSB
10 11010 2		Config 2		-62.2/38.16MHz	index 1
ss-PBCH-BI	ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured I	Configured UE transmitted power (		dBm	23	As defined in clause
$P_{\text{CMAX}, f, c}$				6.2.4 in TS 38.101-1.	
PRACH Configuration			FR1 PRACH configuration 1	As defined in A.3. 8.	
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.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

# A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

# A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.6.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

# A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

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

# A.6.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

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

#### A.6.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

## A.6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

## A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capable 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). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.6.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only 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

Parame	Parameter		Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB pattern 1 in	SSB pattern 1 in	As defined in
			FR1	FR1	A.3.10, except for
	Config 2		SSB pattern 2 in	SSB pattern 2 in	number of SSBs per
			FR1	FR1	SS-burst and
					SS/PBCH block
					index as below
Number of SSBs per SS	-burst		2	2	Different from the
					definition in A.3.10
SS/PBCH block index	SS/PBCH block index		0,1	0,1	Different from the
					definition in A.3.10
CSI-RS Configuration	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 for Cell 1	Config 1		FDD	FDD	
	Config 2		TDD	TDD	
TDD Configuration	Config 2		TDDConf.2.1	TDDConf.2.1	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	TRS.1.1 FDD	
	Config 2		TRS.1.2 TDD	TRS.1.2 TDD	
OCNG Pattern Note 1			OP.1	OP.1	As defined in
					A.3.2.1.
RMSI CORESET	Config 1		CR.1.1 TDD	CR.1.1 TDD	
Reference Channel					
	Config 2		CR.2.1 TDD	CR.2.1 TDD	

	Dedicated CORESET Reference Channel			CCR.1.1 TDD	CCR.1.1 TDD	
		Config 2		CCR.2.1 TDD	CCR.2.1 TDD	
PDSCH para	meters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 2	1	SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
NR RF Chan	NR RF Channel Number			1	1	
EPRE ratio o	f PSS to S	SS	dB			
EPRE ratio o	f PBCH_D	MRS to SSS	dB			
EPRE ratio o	f PBCH to	PBCH_DMRS	dB			
EPRE ratio o	f PDCCH_	DMRS to SSS	dB	0	0	
EPRE ratio o	f PDCCH t	o PDCCH_DMRS	dB			
EPRE ratio o	f PDSCH_I	DMRS to SSS	dB			
EPRE ratio o	f PDSCH to	o PDSCH_DMRS	dB			
	$\hat{E}_{s}/I_{ot}$		dB	3	3	Power of SSB with
SSB with	$N_{oc}$	Config 1	dBm/15kHz	-98	-98	index 0 is set to be
index 0	- 'oc	Config 2		-101	-101	above configured rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	3	3	- 10.6 11.10011011000
	SS-RSR		dBm/ SCS	-95	-95	
	$\hat{E}_{s}/I_{ot}$		dB	-17	-17	Power of SSB with
SSB with	$N_{oc}$	Config 1	dBm/15kHz	-98	-98	index 1 is set to be
index 1	1 oc	Config 2		-101	-101	below configured rsrp-ThresholdSSB
	$\hat{E}_s/N_{oc}$		dB	-17	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	
Io Note 2		Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 1100 2		Config 2		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured L	Configured UE transmitted power (		dBm	23	23	As defined in clause
P <sub>CMAX.</sub> f, c			-		6.2.4 in TS 38.101- 1.	
PRACH Con	figuration			FR1 PRACH	FR1 PRACH	As defined in
				configuration 2	configuration 3	A.3.8.2.
Propagation	Condition		-	AWGN	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

# A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

# A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.6.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.6.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

# A.6.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

# A.6.3.2.3 SA: RRC Connection Release with Redirection

#### A.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

# A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

# A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2. Cell 1 and Cell 2 belong to different tracking areas.

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 or	ally 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

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	2.3	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Cell 1		Cell 2	
		T1	T2	T1	T2

NR RF Channel Number	r	T T	1 2
	Config 1	+	FDD
Duplex mode	Config 2,3		TDD
	Config 1		SSB.1 FR1
SSB Configuration	Config 2	_	SSB.1 FR1
	Config 3 Config 1		SSB.2 FR1 TRS.1.1 FDD
CSI-RS for tracking	Config 2	+ -	TRS.1.1 TDD
oor no for tracking	Config 3		TRS.1.2 TDD
	Config 1		Not Applicable
TDD configuration	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
	Config 1		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	Config 2	MHz	10: N <sub>RB,c</sub> = 52
	Config 3		40: N <sub>RB,c</sub> = 106
	Config 1		10: N <sub>RB,c</sub> = 52
BWP BW	Config 2	MHz	10: N <sub>RB,c</sub> = 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
	Config 1,2		SMTC.1 FR1
SMTC configuration	Config 3		SMTC.2 FR1
PDSCH/PDCCH	Config 1,2		15 kHz
subcarrier spacing	Config 3	⊢ kHz ⊢	30 kHz
	Config 1,2		15 kHz
PUCCH/PUSCH subcarrier spacing	Config 3	kHz	
PRACH configuration	Coming o	+	30 kHz FR1 PRACH configuration 1
•	Later DL DVAD		
BWP configuration	Initial DL BWP	1	DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DEPRE ratio of PDCCH to I	SS MRS to SSS PBCH DMRS DMRS to SSS	dB	0

EDDE ***	LDDCCH DMDC +- CCC						
	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)							
Note2		dBm/15kH			١٥.		
$N_{oc}$	N <sub>oc</sub>			-98			
Note2	Note2 Config 1,2			-98			
N oc	Noce Config 3		-95				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	$\hat{\mathbf{E}}_{s}/\mathbf{I}_{ot}$		4	4	-infinity	4	
$\hat{E}_s/N_{oc}$	$\hat{E}_s/N_{oc}$		4	4	-infinity	4	
IoNote3	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59	
10 110	Config 3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49	
Propagati	on condition	-		AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{max}$  to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

 $T_{connection\_release\_redirect\_NR} = T_{RRC\_procedure\_delay} + T_{identify\_NR} + T_{SI\_NR} + T_{RACH},$ 

where:

 $T_{RRC\_procedure\_delay} = 110$  msin the test.

 $T_{identify-NR} = 680 \text{ ms in the test.}$ 

 $T_{SI-NR} = 1280$  ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 170 \text{ ms in the test.}$ 

This gives a total of 2240 ms.

#### A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

# A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

#### A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	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		S	2.3	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Parameter		Unit	Cel	l1		
Param			T1	T2		
RF Channel Number			1			
Duplex mode	Config 1,4		FD	D		
Bupiex mode	Config 2,3,5,6		TD			
	Config 1,4	<b>⊣</b>	SSB.1			
SSB Configuration	Config 2,5	_	SSB.1			
	Config 3,6		SSB.2			
	Config 1,4		TRS.1.			
CSI-RS for tracking	Config 2,5	⊣ ⊢	TRS.1.			
	Config 3,6		TRS.1.2 TDD			
	Config 1,4	_	Not Applicable			
TDD configuration	Config 2,5		TDDCc	onf.1.1		
	Config 3,6		TDDCc	onf.2.1		
	Config 1,4		10: N <sub>RB,c</sub> = 52			
BW <sub>channel</sub>	Config 2,5	MHz	10: N <sub>RB,c</sub> = 52			
	Config 3,6		40: N <sub>RB,c</sub> = 106			
	Config 1,4		10: N <sub>RB</sub>	s,c = 52		
BWP BW	Config 2,5	MHz	10: N <sub>RB,c</sub> = 52			
	Config 3,6	] [	40: $N_{RB,c} = 106$			
DRx Cycle		ms	Not Applicable			
PDSCH Reference measurement channel	Config 1,4		SR.1.1	FDD		

		Config 2,5		SR.1.1	TDD
		Config 3,6		SR2.1	TDD
		Config 1,4		CR.1.1	FDD
CORESET Channel	Reference	Config 2,5		CR.1.1	TDD
		Config 3,6		CR2.1	TDD
OCNG Par	terns			OCNG p	attern 1
		Config 1,2,4,5		SMTC.	
SMTC con	figuration	Config 3,6		SMTC.	
DD0011/D1	20011	Config 1,2,4,5		15 k	
PDSCH/PI subcarrier		Config 3,6	kHz	30 k	
		Config 1,2,4,5			
PUCCH/P		_	kHz	15 k	
subcarrier		Config 3,6		30 k	
	onfiguration	-1		FR1 PRACH configuration 1	
BWP confi	guraiton	Initial DL BWP		DLBWP.0.1	
		Dedicated DL BWP		DLBW	
		Initial UL BWP		ULBW	P.0.1
		Dedicated UL BWP		ULBWP.1.1	
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  EPRE ratio of OCNG DMRS to SSS(Note 1)  EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0		
Note2			dBm/15kH z	-9	8
Note2	Config 1,2,4	l,5		-9	8
N <sub>oc</sub> Config 3,6		dBm/SCS	-9		
${f \hat{E}}_{_{ m s}}/{ m I}_{_{ m ot}}$			dB	4	4
$\hat{E}_s/N_{oc}$			dB	4	4
lo <sup>Note3</sup>	Config 1,2,4	1,5	dBm/ 9.36MHz	-64.59	-64.59
	Config 3,6		dBm/ 38.16MHz	-58.49	-58.49
Propagation	on condition		- alla ara fullu	AW	GN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N_{oc}}$  to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

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	Се	ell 2
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6		1 <b>2</b> 2
Duplex mode		1, 2, 3		DD .
Buplex mode		4, 5, 6		DD D
TDD special subframe		4, 5, 6		6
configuration <sup>Note1</sup>		., 0, 0		•
TDD uplink-downlink		4, 5, 6		1
configuration <sup>Note1</sup>				
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: N	N <sub>RB,c</sub> = 25
				$N_{RB,c} = 50$
			20 MHz: N	N <sub>RB,c</sub> = 100
PRACH Configuration <sup>Note2</sup>		1, 2, 3		4
		4, 5, 6		53
PDSCH parameters:		1, 2, 3		R.7 FDD
DL Reference Measurement				R.3 FDD
Channel <sup>Note3</sup>				R.6 FDD
		4, 5, 6		R.4 TDD
				R.0 TDD
DOELGH/DDGGH/DHIGH		4.0.0		R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3		R.11 FDD R.6 FDD
parameters: DL Reference Measurement				R.10 FDD
Channel <sup>Note3</sup>		4, 5, 6		R.11 TDD
Chamer		4, 5, 6		R.6 TDD
				R.10 TDD
OCNG Patterns <sup>Note3</sup>		1, 2, 3		P.20 FDD
o o i vo i allomo		1, 2, 0		P.10 FDD
				P.17 FDD
		4, 5, 6		P.9 TDD
			10 MHz: 0	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 <sup>Note4</sup> OCNG_RB <sup>Note4</sup>	_			
N <sub>oc</sub> Note5	dDm/4Eld !-	1 2 2 4 5 2	,	20
^	dBm/15kHz	1, 2, 3, 4, 5, 6		98 T 4
$\hat{E}_s/N_{oc}$ $\hat{E}_s/I_{ot}^{Note6}$	dB dB	1, 2, 3, 4, 5, 6	-Infinity	4 4
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-Infinity -Infinity	-94
SCH_RP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6		-94 -94
IoNote6	dBm/9MHz	1, 2, 3, 4, 5, 6	-Infinity -70.22	-94 -64.76
Propagation Condition	UDITI/SIVIFIZ	1, 2, 3, 4, 5, 6		/GN
	المان طمييمانماد م		AVV	

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].

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:

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 <sub>s</sub> /l <sub>ot</sub> , 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.6.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection\_release\_redirect\_E\_UTRA} = T_{RRC\_procedure\_delay} + T_{identify\_E\_UTRA} + T_{SI\_E\_UTRA} + T_{RACH}$$

where:

 $T_{RRC\_procedure\_delay} = 110 \text{ ms in the test.}$ 

 $T_{identify-E-UTRA} = 800 \text{ ms in the test.}$ 

 $T_{SI\text{-}E\text{-}UTRA} = 1280$  ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

 $T_{RACH} = 15 \text{ ms in the test.}$ 

This gives a total of 2205 ms.

# A.6.4 Timing

# A.6.4.1 UE transmit timing

# A.6.4.1.1 NR UE Transmit Timing Test for FR1

# A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table A.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		onf.2.1
		1	10: N <sub>R</sub>	B,c = 52
BWchannel	MHz	2		B,c = 52
		3		$B_{c} = 106$
Initial DWD Configuration		100		VP.0.1
Initial BWP Configuration		1,2,3		VP.0.1
Dedicated BWP		1,2,3		VP.1.1
Configuration		1,2,0	ULBV	VP.1.1
DRx Cycle	ms	1,2,3	N/A	DRX.8 <sup>Note5</sup>
DDOOLI Dafaaaaa		1	SR.1.	1 FDD
PDSCH Reference measurement channel		2	SR.1.	1 TDD
measurement utatillet		3		1 TDD
		1		1 FDD
RMSI CORESET				
Reference Channel		2		1 TDD
		3		1 TDD
Dedicated CORESET		1		.1 FDD
Reference Channel		2		.1 TDD
		3		.1 TDD
OCNG Patterns		1,2,3		P.1
SSB configuration		1,2		1 FR1
3		3		2 FR1
SMTC Configuration		1,2		TC.1
		3	SMTC.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				
EPRE ratio of PBCH to				
PBCH DMRS	ļ			
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to			_	_
PDCCH DMRS	dB	1,2,3	0	0
EPRE ratio of PDSCH	Ţ			
DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH				
EPRE ratio of OCNG				
DMRS to SSS(Note 1) EPRE ratio of OCNG to	<del> </del>			
OCNG DMRS (Note 1)				
NeteO	dBm/15 kHz	122	-98	-98
N <sub>oc</sub> Note2	UDIII/13 KHZ	1,2,3		
N <sub>oc</sub>	dBm/SCS	1,2	-98	-98
ĉ /ı		3	-95 2	-95
Ê , /I ot		1,2,3	3	3

$\hat{E}_{s}/N_{oc}$		1,2,3	3	3
SS-RSRP <sup>Note3</sup>	dDm/CCC	1,2	-95	-95
	dBm/SCS	3	-92	-92
Io <sup>Note3</sup>	dBm/9.36MHz	1,2	-65.2	-65.2
	dBm/38.1MHz	3	-59.2	-59.2
Propagation condition		1,2,3	AW	'GN
SRS Config		1,2	SRSConf.1 <sup>Note6</sup>	SRSConf.3 <sup>Note6</sup>
		3	SRSConf.1 <sup>Note6</sup>	SRSConf.2 <sup>Note6</sup>

- Note 1: OCNG shall be 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.3.3.8-1
- 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	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	14	Matches N <sub>RB,c</sub>
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

#### 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<sub>TA</sub> offset value (in T<sub>c</sub> units) is 25600
  - b. The  $T_e$  values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

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 <sub>c</sub>	+32*64T <sub>c</sub>	
30	+32*64T <sub>c</sub>	+16*64T <sub>c</sub>	

- 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 7.1.2.1-1 until the UE transmit timing offset is within ( $N_{TA} + N_{TA\_offset}$ )  $\times T_c \pm T_e$  respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within  $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$  of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

# A.6.4.2 UE timer accuracy

# A.6.4.3 Timing advance

# A.6.4.3.1 SA FR1 timing advance adjustment accuracy

# A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

# A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be 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.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+1 for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	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 <sub>A</sub> ) value during T1		31	N <sub>TA_new</sub> = N <sub>TA_old</sub> for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T <sub>A</sub> ) value during T2		39	For 15 kHz SCS $N_{TA\_new} = N_{TA\_old} + 8192*T_c$ For 30 kHz SCS $N_{TA\_new} = N_{TA\_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Por	romotor	Unit	Test1		
Fai	Parameter		T1	T2	
Dupley made	Config 1		FDD		
Duplex mode	Config 2,3		TDD		
	Config 1		Not Applicable		
TDD configuration	Config 2		TDDCo	onf.1.1	
	Config 3		TDDCo	onf.2.1	
	Config 1		10: N <sub>RE</sub>	<sub>3,c</sub> = 52	
BW <sub>channel</sub>	Config 2	MHz 10: N <sub>RB,c</sub> = 52		<sub>3,c</sub> = 52	
	Config 3		40: N <sub>RB,c</sub> = 106		

		T	1
	Config 1		10: N <sub>RB,c</sub> = 52
BWP BW	Config 2	MHz	10: N <sub>RB,c</sub> = 52
	Config 3		40: N <sub>RB,c</sub> = 106
DRx Cycle		ms	Not Applicable
PDSCH Reference	e Config 1		SR.1.1 FDD
measurement	Config 2		SR.1.1 TDD
channel	Config 3		SR.2.1 TDD
DMOLOODEOET	Config 1		CR.1.1 FDD
RMSI CORESET	Config 2		CR.1.1 TDD
Reference Chann	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD
Reference Chann	el		000 4 4 700
	Config 2	4	CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
	Config 1		TRS.1.1 FDD
TRS configuration			TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
OCNG Patterns			OCNG pattern 1
SMTC	Config 1,2		SMTC.1 FR1
configuration	Config 3		SMTC.2 FR1
SSB configuration	Config 1,2		SSB.1 FR1
33B Configuration	Config 3		SSB.2 FR1
PDSCH/PDCCH	Config 1,2	kHz	15 kHz
subcarrier spacing	Config 3		30 kHz
PUCCH/PUSCH	Config 1,2		15 kHz
subcarrier spacing	Config 3	kHz	30 kHz
EPRE ratio of PS	S to SSS		
EPRE ratio of PB	CH DMRS to SSS		
	CH to PBCH DMRS	1	
	CCH DMRS to SSS		
	CCH to PDCCH DMRS		
	SCH DMRS to SSS	dB	0
EPRE ratio of PD			
	NG DMRS to SSS(Note 1)		
	NG to OCNG DMRS (Note	-	
1)	ive to corve billive (Note		
Note2		dBm/15kH	-98
		Z	
Note2 Config 1,2		dBm/SCS	-98
Comi	g 3		-95
Ê , /I ot		dB	3
Ê , /N .cc		dB	3
Config Io <sup>Note3</sup>	g 1,2	dBm/ 9.36MHz dBm/	-67.57
Config	Config 3		-62.58
Propagation cond	ition	-	AWGN

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral Note 1: density is achieved for all OFDM symbols.

Interference from other cells and noise sources not specified in the test is 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 3: lo levels have been derived from other parameters for information purposes. They are not settable

parameters themselves.

Field Value Comment 12 Config 1,2 c-SRS Config 3 24 Frequency hopping is disabled b-SRS 0 b-hop 0 freqDomainPosition 0 Frequency domain position of SRS freqDomainShift 0 No group or sequence hopping groupOrSequenceHopping neither sl5=2 for SCS Once every 5 slots 15kHz SRS-PeriodicityAndOffset sl5=4 for SCS 30kHz SSB #0 is used for SRS path loss pathlossReferenceRS ssb-Index=0 estimation Codebook based UL transmission Codebook usage startPosition resourceMapping setting. SRS on last nrofSymbols n1 symbol of slot, and 1symbols for SRS without repetition. repetitionFactor n1 0 combOffset-n2 transmissionComb setting cyclicShift-n2 0 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]

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

# A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

# A.6.5 Signalling characteristics

# A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

# A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

# A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

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

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
·	Config 2, 3		TDD
BW <sub>channel</sub>	Config 1	MHz	10: N <sub>RB,c</sub> = 52
	Config 2		10: N <sub>RB,c</sub> = 52
	Config 3		40: N <sub>RB,c</sub> = 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
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD

			•	
		Config 2		CCR.1.3 TDD
		Config 3		CCR.2.2 TDD
SSB Config	uration	Config 1		SSB.1 FR1
		Config 2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Conf	figuration	Config 1, 2		SMTC.1
		Config 3		SMTC.1
PDSCH/PD		Config 1, 2		15 kHz
subcarrier s	pacing	Config 3		30 kHz
PRACH		Config 1, 2		Table A.3.8.2.1-1
Configuration	on	Config 3		Table A.3.8.2.1-1
SSB index a	assigned a	s RLM RS		0
OCNG para				OP.1
CP length				Normal
Correlation	Matrix and	Antenna		2x2 Low
Configuration	on			
Out of	DCI form	at		1-0
sync		of Control OFDM		2
transmissi	symbols			
on	Aggregat	ion level	CCE	8
parameter	Ratio of h	nypothetical	dB	4
S	PDCCH I	RE energy to		
		SSS RE energy		
		nypothetical	dB	4
		DMRS energy to		
	average	SSS RE energy		
	DMRS pr	recoder		REG bundle size
	granulari			
	REG bun	ıdle size		6
DRX				OFF
Gap pattern	ı ID			gp0
Layer 3 filte	ring			Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311				1
CSI-RS		Config 1		CSI-RS.1.1 FDD
configuration for CSI		Config 2		CSI-RS.1.1 TDD
reporting		Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking		Config 1		TRS.1.1 FDD
		Config 2		TRS.1.1 TDD
		Config 3		TRS.1.2 TDD
T1				0.2
T2	T2			0.48
T3			S	0.48
D1			S	0.44
Note 1: All configurations are assigned to the UE prior to the start of time				

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	it Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB	4		

EPRE ratio of PDCCH to PDCCH DMRS				0		
EPRE ratio of PBC	dB					
EPRE ratio of PBC	dB					
EPRE ratio of PSS	to SSS	dB				
EPRE ratio of PDS	CH DMRS to SSS	dB		0		
EPRE ratio of PDS	CH to PDSCH DMRS	dB				
EPRE ratio of OCN	IG DMRS to SSS	dB				
EPRE ratio of OCN	NG to OCNG DMRS	dB				
SNR on RLM-RS	Config 1	dB	1	-7	-15	
	Config 2		1 -7 -15			
	Config 3		1	-7	-15	
$N_{oc}$	Config 1	dBm/		-98		
1 voc	Config 2	15kH		-98		
	Config 3	Z		-98		
$N_{oc}$	Config 1	dBm/		-98		
1 voc	Config 2	SCS	CS -98			
			-95			
Propagation condit		TDL	C 300ns 1	00Hz		
			1 are fully a sity is achie			

- 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.6.5.1.1.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 1	
		Value	
gapOffset		0	
Note:	Ensure that RLM RS is partially overlapped with measurement gap		

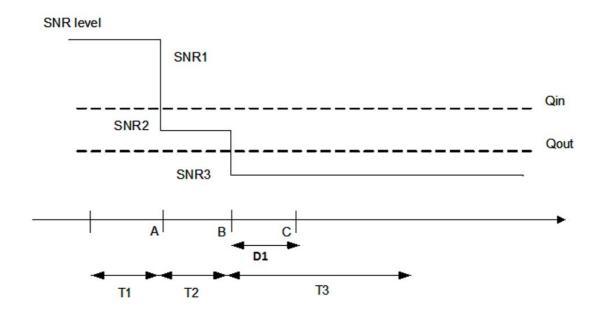


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

# 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.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized 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	
	is only required to pass in one of the supported test ations in FR1	

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

RF Channel Number	Par	ameter	Unit	Value
RF Channel Number				Test 1
Duplex mode				Cell 1
Config 2, 3				1
Dedicated Config 1 Config 2 Config 3 Config 3 Config 3 Config 40: Not A Configuration Configuration Configuration Configuration UL dedicated BWP configuration UL dedicated BWP configuration UL dedicated BWP configuration UL dedicated BWP configuration Config 1, 2, 3 ULE Configuration UL dedicated BWP configuration Config 1 Config 2 TDD Config 3 TDD Configuration Config 2 Config 3 CR.:    Dedicated Config 1 Config 1 Config 2 Config 3 CR.:   Config 2 Config 3 CR.:   Config 3 CR.:   Config 4 CORESET Reference Channel Config 1 COR. CORESET Reference Channel Config 1 COR. CORESET Reference Channel Config 1 COR. CORESET Reference Channel Config 3 COR. COR. SSB Configuration Config 1 SSE Config 3 SSE SMTC Config 3 SSE SMTC Config 3 SSE SMTC Config 3 SSE SSE COnfiguration Config 3 SSE SSE CONFIGURATION CONFIG 3 SSE SSE CONFIGURATION CONFIG 3 SSE SSE CONFIGURATION CONFIG 3 SSE SSE SSE CONFIGURATION CONFIG 3 SSE SSE SSE CONFIGURATION CONFIG 3 SSE SSE SSE CONFIGURATION CONFIG 3 SSE SSE SSE CONFIGURATION CONFIG 3 SSE SSE SSE CONFIGURATION CONFIGU	Duplex mode			FDD
Config 2				TDD
DL initial BWP   Config 1, 2, 3   DLE	BW <sub>channel</sub>		MHz	10: N <sub>RB,c</sub> = 52
DL initial BWP configuration         Config 1, 2, 3         DLE           DL dedicated BWP configuration         Config 1, 2, 3         DLE           UL initial BWP configuration         Config 1, 2, 3         ULB           UL dedicated BWP configuration         Config 1, 2, 3         ULB           TDD Configuration         Config 1         Not A           Config 2         TDD           Config 3         TDD           RMSI CORESET config 1         Config 2           Reference Channel         Config 2         CR.           Config 3         CR.           Dedicated CORESET Reference Channel         Config 1         CCR           CORESET Reference Channel         Config 2         CCR           Config 3         CCR         CCR           SSB Configuration         Config 2         CCR           Config 2         Config 3         SSE           SMTC         Config 1, 2         SM           Config 3         SM         SM           PDSCH/PDCCH config 1, 2         SM         SM           SW config 3         Table A         Table A           Configuration         Config 3         Table A           Configuration         Config 3         Table A				10: N <sub>RB,c</sub> = 52
configuration         DL dedicated BWP config 1, 2, 3         DLE           configuration         UL initial BWP config 1, 2, 3         ULE           configuration         Config 1, 2, 3         ULE           UL dedicated BWP configuration         Config 1         Not A           TDD Configuration         Config 1         Not A           Config 2         TDD         Config 2           Config 3         TDD         Config 3           RMSI CORESET config 1         Config 2         CR.           Config 3         CR.         Config 3           Dedicated config 1         Config 2         CCR           CORESET config 1         CCR         CCR           Config 2         CCR         CCR           Config 3         CCR         CCR           SSB Configuration         Config 1         SSE           SMTC config 1         SSE         SSE           Config 3         SSE           SMTC config 1, 2         SSE           Config 3         SSE           PDSCH/PDCH config 1, 2         SSE           Subcarrier spacing         Config 3         Table A           PRACH config 1, 2         Table A           Config 3         Table A <td></td> <td></td> <td></td> <td>40: N<sub>RB,c</sub> = 106</td>				40: N <sub>RB,c</sub> = 106
configuration         DLE           UL initial BWP configuration         Config 1, 2, 3         ULB           UL dedicated BWP configuration         Config 1, 2, 3         ULB           TDD Configuration         Config 1         Not A           Config 2         TDD           RMSI CORESET         Config 1         CR.           Reference Channel         Config 1         CR.           Dedicated         Config 2         CR.           CORESET         Config 1         CCR           Reference Channel         Config 2         CCR           Config 3         CCR           SSB Configuration         Config 1         SSE           SMTC         Config 3         SSE           SMTC         Config 3         SSE           Configuration         Config 3         SM           PDSCH/PDCH         Config 1, 2         SM           Subcarrier spacing         Config 3         Table A           Configuration         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         CP length         N           Correlation Matrix and Antenna         2x           Configuration         Configuration         Configuration	configuration			DLBWP.0.1
configuration         UL dedicated BWP configuration         Config 1, 2, 3         ULB           TDD Configuration         Config 1         Not A Config 2         TDD           RMSI CORESET Reference Channel         Config 1         CR.: Config 3         CR.: Config 3           Dedicated CORESET Reference Channel         Config 1         CCR         CCR           Config 2 Config 3         CCR         CCR           SSB Configuration         Config 1         SSE           SMTC Config 3         SSE           Config 3 SSE         SMTC         Config 3, 2         SM           Configuration         Config 3, 2         SM         SM           PDSCH/PDCCH subcarrier spacing         Config 1, 2         SM         SM           PRACH Configuration         Config 3         Table A         Table A           SSB index assigned as RLM RS         OCNG parameters         COF         CP length         N           Correlation Matrix and Antenna Configuration         Configuration         N         Configuration         Configuration				DLBWP.1.1
configuration         Config 1         Not A           Config 2         TDD           Config 3         TDD           RMSI CORESET         Config 1         CR.           Reference Channel         Config 2         CR.           Dedicated         Config 1         CCR           CORESET         Config 1         CCR           Reference Channel         Config 2         CCR           Config 3         CCR           Config 4         SSE           Config 5         SSE           Config 6         Config 1           Config 7         SSE           SMTC         Config 1         SSE           Config 3         SSE           SMTC         Config 3         SM           Configuration         Config 3         SM           PDSCH/PDCCH         Config 1, 2         1           subcarrier spacing         Config 3         3           PRACH         Config 1, 2         Table A           Configuration         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         OCNG parameters           CP length         N         N           Configuration <td< td=""><td></td><td>Config 1, 2, 3</td><td></td><td>ULBWP.0.1</td></td<>		Config 1, 2, 3		ULBWP.0.1
TDD Configuration         Config 1         Not A           Config 2         TDD           RMSI CORESET         Config 1         CR.           Reference Channel         Config 2         CR.           Dedicated         Config 1         CCR           CORESET         Config 1         CCR           Reference Channel         Config 2         CCR           Config 3         CCR           Config 4         SSE           Config 5         SSE           Config 6         Config 1           Config 7         SSE           SMTC         Config 1         SSE           Config 1         SSE           SMTC         Config 3         SM           Configuration         Config 3         SM           PDSCH/PDCCH         Config 1, 2         1           subcarrier spacing         Config 3         3           PRACH         Config 1, 2         Table A           Configuration         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         OCNG parameters           CP length         N         N           Configuration         N         N		Config 1, 2, 3		ULBWP.1.1
Config 2		Config 1		Not Applicable
RMSI CORESET         Config 1         CR.           Reference Channel         Config 2         CR.           Dedicated         Config 1         CCR           CORESET         Reference Channel         Config 2         CCR           Config 3         CCR         Config 3         CCR           SSB Configuration         Config 1         SSE           Config 3         SSE         SSE           SMTC         Config 1, 2         SM           Configuration         Config 3         SM           PDSCH/PDCCH         Config 1, 2         SM           subcarrier spacing         Config 1, 2         19           Config 3         Table A           Configuration         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         COR           CP length         N         N           Correlation Matrix and Antenna         2x           Configuration         2x				TDDConf.1.1
Reference Channel         Config 2         CR.           Dedicated CORESET Reference Channel         Config 1         CCR           Config 2 Config 3         CCR           SSB Configuration         Config 1 Config 2 Config 3         SSE           SMTC Configuration         Config 1, 2 Config 3         SM           PDSCH/PDCCH subcarrier spacing         Config 1, 2 Config 3         SM           PRACH Configuration         Config 1, 2 Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         COP length           Correlation Matrix and Antenna Configuration         2x				TDDConf.2.1
Config 3	RMSI CORESET			CR.1.1 FDD
Dedicated CORESET Reference Channel         Config 1         CCR           Reference Channel         Config 2 CCR         CCR           SSB Configuration         Config 1 SSE         SSE           Config 2 Config 3 SSE         Config 2 SSE           Config 3 SSE         SMTC Config 1, 2 SM           Configuration         Config 3 SM           PDSCH/PDCCH subcarrier spacing         Config 1, 2 SM           Config 3 SM         Config 3 SM           PRACH Config 1, 2 Config 3 SSB index assigned as RLM RS         Table A           OCNG parameters         CORG parameters           CP length         N           Correlation Matrix and Antenna Configuration         2x	Reference Channe			CR.1.1 TDD
CORESET Reference Channel           Config 2         CCR           Config 3         CCR           SSB Configuration         Config 1         SSE           Config 2         SSE           Config 3         SSE           SMTC         Config 1, 2         SM           Configuration         Config 3         SM           PDSCH/PDCCH subcarrier spacing         Config 1, 2         15           Config 3         30         30           PRACH Config 1, 2         Table A         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         COR         CP length         N           Correlation Matrix and Antenna Configuration         2x         COR         C				CR.2.1 TDD
Config 2         CCR           Config 3         CCR           SSB Configuration         Config 1         SSE           Config 2         SSE           Config 3         SSE           SMTC         Config 1, 2         SM           Configuration         Config 3         SM           PDSCH/PDCCH subcarrier spacing         Config 1, 2         15           Config 3         30         30           PRACH configuration         Config 1, 2         Table A           Configuration         Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         CCP length           Correlation Matrix and Antenna         2x           Configuration         2x	CORESET			CCR.1.1 FDD
Config 3   CCR	Reference Channe		$\dashv$	CCR.1.1 TDD
SSB Configuration         Config 1 Config 2 SSE           Config 3         SSE           SMTC Config 1, 2 Config 3         SME           PDSCH/PDCCH subcarrier spacing         Config 1, 2 Config 3           PRACH Config 1, 2 Config 3         Table A           Configuration         Config 3 Table A           SSB index assigned as RLM RS         CONG parameters           CP length         N           Correlation Matrix and Antenna         2x           Configuration         2x			-	CCR.2.1 TDD
Config 2   SSE	SSR Configuration			SSB.1 FR1
Config 3   SSE	30D Configuration			SSB.1 FR1
SMTC Configuration Config 3 PDSCH/PDCCH subcarrier spacing  PRACH Config 1, 2 Config 3  PRACH Config 3  PRACH Configuration Config 1, 2 Config 3  Table A  SSB index assigned as RLM RS OCNG parameters CP length Correlation Matrix and Antenna Configuration  SMTC Config 3  SMTC Config 3  SMTC Config 3  SMTC Config 3  SM Config 3  Table A  Configuration  SSB index assigned as RLM RS OCNG parameters CP length Correlation Matrix and Antenna Configuration		Config 3		SSB.2 FR1
ConfigurationConfig 3SMPDSCH/PDCCH subcarrier spacingConfig 1, 218PRACH ConfigurationConfig 1, 2Table ASSB index assigned as RLM RSConfig 3Table AOCNG parametersCP lengthNCorrelation Matrix and Antenna Configuration2x	SMTC	Config 1 2		SMTC.1
PDSCH/PDCCH subcarrier spacing  PRACH Config 1, 2  Config 3  PRACH Config 1, 2  Config 3  Table /  Config 3  SSB index assigned as RLM RS  OCNG parameters  CP length  Correlation Matrix and Antenna  Configuration				SMTC.1
PRACH Configuration         Config 1, 2 Config 3         Table A           SSB index assigned as RLM RS         OCNG parameters         Coffig 3           OCNG parameters         Coffig 3         Coffig 3           CP length         N         N           Correlation Matrix and Antenna Configuration         2x	PDSCH/PDCCH	Config 1, 2		15 kHz
Configuration  Config 3  SSB index assigned as RLM RS  OCNG parameters  CP length  Correlation Matrix and Antenna  Configuration  Configuration  Table A  Ta	subcarrier spacing	Config 3		30 kHz
SSB index assigned as RLM RS  OCNG parameters  CP length  Correlation Matrix and Antenna  Configuration		Config 1, 2		Table A.3.8.2.1-1
OCNG parameters  CP length  Correlation Matrix and Antenna  Configuration	Configuration	Config 3		Table A.3.8.2.1-1
CP length N Correlation Matrix and Antenna 2x Configuration				0
Correlation Matrix and Antenna 2x Configuration	OCNG parameters			OP.1
Configuration				Normal
n sync DCI format	Configuration			2x2 Low
	n sync	DCI format		1-0
transmission Number of Control parameters OFDM symbols	transmission			2

	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		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking	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

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter	Unit			Test 1		
		T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB	0				
EPRE ratio of PDCCH to PDCCH DMRS	dB			0		

EPRE ratio of PBCH DMRS to SSS			dB dB					
EPRE rat	EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PSS to SSS			dB					
EPRE rat	io of PDSC	CH DMRS to SSS	dB			0		
EPRE rat	io of PDSC	CH to PDSCH DMRS	dB					
EPRE rat	io of OCN	G DMRS to SSS	dB					
EPRE rat	io of OCN	G to OCNG DMRS	dB					
SNR on F	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
M		Config 1	dBm/			-98		
$N_{oc}$		Config 2	15			-98		
Config 3		kHz	-98					
$N_{oc}$		Config 1	dBm/	-98				
<sup>1</sup> V <sub>oc</sub>		Config 2	SCS			-98		
		Config 3				-95		
Propagat	ion condition	on			TDL-C	300ns	100Hz	
Note 1:	OCNG sh	nall be used such that th	ne resour	ces in	Cell 1	are full	y alloca	ted
	and a cor	nstant total transmitted	power sp	ectral	density	is ach	ieved fo	or all
	OFDM sy	mbols.						
Note 2: The signal contains PDCCH for UEs other than			r than	the dev	ice un	der test	as	
part of OCNG.								
Note 3: SNR levels correspond to the sign			•					
Note 4: The SNR in time periods T1, T2,								
SNR2, SNR3, SNR4 and SNR5								
Note 5: The SNR values are specified for testing a UE which supports 2RX on a								
least one band. For testing of a UE which supports 4RX on all bands, the				, the				
	SNR during T3 and T4 is modified as specified in clause A.3.6.							

Table A.6.5.1.2.1-4: Void

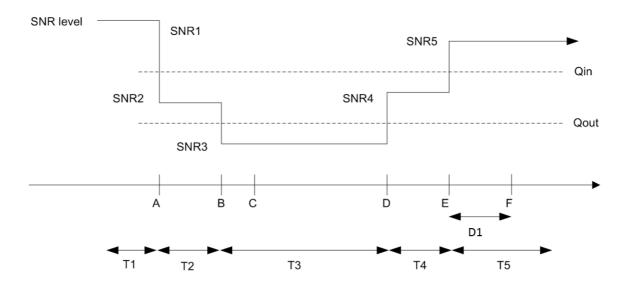


Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

# A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

## A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

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		
	The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Para	Parameter		Value
			Test 1
			- · · ·
Active PCell			Cell 1
RF Channel Numb	oer		1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW <sub>channel</sub>	Config 1	MHz	10: N <sub>RB,c</sub> = 52
	Config 2		10: N <sub>RB,c</sub> = 52
	Config 3		40: N <sub>RB,c</sub> = 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	Config 1, 2, 3		
configuration	Coming 1, 2, 3		ULBWP.0.1

UL dedicated	Config 1, 2, 3	1	
BWP	Comig 1, 2, 3		ULBWP.1.1
configuration			OLDWI III
TDD	Config 1		Not Applicable
Configuration	Config 2		TDDConf.1.1
Comigaration	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference	Config 2		CR.1.1 TDD
Channel	Config 3		CR.2.1 TDD
Dedicated	Config 1		CCR.1.3 FDD
CORESET	Cornig		CCK.1.3 FDD
Reference			
Channel			
Charine	Config 2		CCR.1.3 TDD
	Config 3		CCR.2.2 TDD
SSB			SSB.1 FR1
	Config 1		
Configuration	Config 2		SSB.1 FR1
OMTO	Config 3		SSB.2 FR1
SMTC	Config 1, 2		SMTC.1
Configuration	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	Config 3		Table A.3.8.2.1-1
SSB index assign	ed as RLM RS		0
OCNG parameter			OP.1
CP length			Normal
Correlation Matrix	and Antenna		2x2 Low
Configuration			
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of	dB	4
	hypothetical		
	PDCCH RE		
	energy to average		
	SSS RE energy		
	Ratio of	dB	4
	hypothetical		
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX Configuration	n		DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for	Config 1	<u> </u>	TRS.1.1 FDD
tracking	Config 2		TRS.1.1 TDD
		1	

	Config 3		TRS.1.2 TDD
T1		S	0.2
T2		S	0.68
T3		S	0.68
D1		S	0.64

Note 1: All configurations are assigned to the UE prior to the start of time period

Т1.

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

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Pa	rameter	Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCC	EPRE ratio of PDCCH DMRS to SSS			4	
EPRE ratio of PDC0	CH to PDCCH DMRS	dB		0	
EPRE ratio of PBCh	I DMRS to SSS	dB			
EPRE ratio of PBCH	I to PBCH DMRS	dB			
EPRE ratio of PSS t	to SSS	dB		0	
EPRE ratio of PDSC	CH DMRS to SSS	dB			
EPRE ratio of PDSC	EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCN	EPRE ratio of OCNG to OCNG DMRS				
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
Config 3			1	-7	-15
Λ/ Config 1		dBm/15		-98	
N Config 1		kHz	-98		
Config 3				-98	
N <sub>oc</sub> Config 1		dBm/S	-98		
¹ Voc	Config 2	CS		-98	·
	Config 3			-95	·
Propagation condition	on			TDL-C 300ns 100h	-lz

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.

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

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

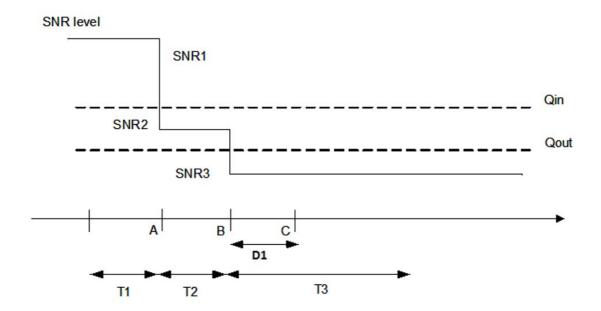


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

#### A.6.5.1.3.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

# A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
	is only required to pass in one of the supported test ations in FR1

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active PCell			Cell 1	
RF Channel Number	10 " 1		1	
Duplex mode	Config 1		FDD	
514	Config 2, 3		TDD	
BW <sub>channel</sub>	Config 1	MHz	10: N <sub>RB,c</sub> = 52	
	Config 2	_	10: N <sub>RB,c</sub> = 52	
	Config 3		40: N <sub>RB,c</sub> = 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	
9	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
RMSI CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD	
Troforonoo Onamior	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	
garanen	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 kHz	
subcarrier spacing	Config 3		30 kHz	
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1	
	Config 3		Table A.3.8.2.1-1	
	SSB index assigned as RLM RS		0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix and Configuration	Antenna		2x2 Low	
	CI format		1-0	
transmission Nu	mber of Control DM symbols		2	

	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		
_		4D	
	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		_
-	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to	uВ	7
	average SSS RE		
	energy		
-	Ratio of hypothetical	dB	4
	PDCCH DMRS	uБ	4
	energy to average		
	SSS RE energy		DEO hamalla a'-a
	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	2000
T311 timer		ms	1000
N310			1
N311			
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
Col-Ro Ioi liacking			
	Config 2		TRS.1.1 TDD
Config 3		S	TRS.1.2 TDD
	<u>T1</u>		0.2
T2		S	0.2
T3		S	0.64
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: All config	urations are assigned to	the UE	prior to the start of time period

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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 PDCCH DMRS to SSS	dB	0				
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						
			0					
EPRE ratio of PSS	to SSS	dB			0			
EPRE ratio of PDS	SCH DMRS to SSS	dB						
EPRE ratio of PDS	CH to PDSCH DMRS	dB						
EPRE ratio of OCN	NG DMRS to SSS	dB						
EPRE ratio of OCN	NG to OCNG DMRS	dB						
SNR on RLM-RS	Config 1	dB	1 -7 -15 -4.5		1			
	Config 2		1	-7	-15	-4.5	1	
	Config 3		1	-7	-15	-4.5	1	
N <sub>oc</sub> Config 1		dBm/15	-98					
Config 2		kHz	-98					
Config 3			-98					
Λ/ Config 1		dBm/S	-98					
$N_{oc}$	Config 2	CS	-98					
	Config 3			•	-95	•		
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.
- The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 2:
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.4.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 5: testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.6.5.1.4.1-4: Void Table A.6.5.1.4.1-5: Void

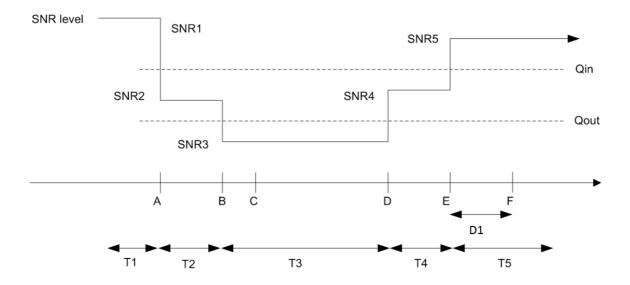


Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

#### 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 of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

C	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:	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	Active PCell		Cell 1
RF Channel Number	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
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD

	Config 2	1	CCR.1.3 TDD
	Config 3		CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
002 001111gu. a	Config 2		SSB.1 FR1
	Config 3	1	SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
· ·	Config 3	1	SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for P	DCCH/PDSCH		TCI.State.2
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 energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
CSI-RS configuration for CSI reporting	Config 2		CSI-RS.1.1 TDD
for CSI reporting	Config 1 Config 2 Config 3		CSI-RS.1.1 TDD CSI-RS.2.1 TDD
for CSI reporting T1	Config 2	s	CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2
for CSI reporting  T1  T2	Config 2	S	CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2 0.88
for CSI reporting T1	Config 2		CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2

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
EPRE ratio of PDCCH DMRS to SSS	dB	4		

EPRE ratio	of PDCCH to PDCCH	dB				
EPRE ratio of PBCH DMRS to SSS		dB				
EPRE ratio of PBCH to PBCH DMRS		dB	0			
EPRE ratio of PSS to SSS		dB				
EPRE ratio	of PDSCH DMRS to	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	dB	1	-7	-15	
RLM-RS	Config 2		1	-7	-15	
	Config 3		1	-7	-15	
λI	Config 1	dBm/15kHz	-98			
$N_{oc}$	Config 2		-98			
	Config 3		-98			
Propagation condition			TDL-C 300ns 100Hz			
Note 1: C	CNG shall be used sucl	that the resources in	n Cell 1 are fully allo	cated and a constant t	otal transmitted	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0
Note 1: Void	

# SNR 1 SNR 2 Qout SNR 3 Cell 1 SNR level

T3

#### 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:

T2

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 of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Configuration

Description

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

		Value
		Test 1
		Cell 1
		1
1		FDD
2, 3		TDD
1		Not Applicable
2		TDDConf.1.1
3		TDDConf.2.1
1, 2, 3		DLBWP.0.1
1, 2, 3		DLBWP.1.1
1, 2, 3		ULBWP.0.1
1, 2, 3		ULBWP.1.1
1		CR.1.1 FDD
2		CR.1.1 TDD
3		CR.2.1 TDD
1		CCR.1.1 FDD
		CCD 4.4 TDD
2		CCR.1.1 TDD
3		CCR.2.1 TDD
1		SSB.1 FR1 SSB.1 FR1
2		SSB.1 FR1
3		SMTC.1
		SMTC.1 15 kHz
•		
		30 kHz
1		TRS.1.1 FDD
		TRS.1.1 TDD
3		TRS.1.2 TDD
		Resource #4 in TRS.1.1 FDD
		Resource #4 in TRS.1.1 TDD
		Resource #4 in TRS.1.2 TDD
DSCH		TCI.State.0
		OP.1
		Normal
Configuration		2x2 Low
		1-0
		2
r of Control OFDM		
r of Control OFDM		
r of Control OFDM	CCE dB	8 4
	1, 2 3 1, 2 3 1, 2 3 1 1 2 3 1 Configuration mat	1, 2 3 1, 2 3 1, 2 3 1 1 2 3 1 Configuration mat

	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
EPRE ratio of PDCCH DMR	S to dB			0		
EPRE ratio of PDCCH to PD DMRS	CCH dB					
EPRE ratio of PBCH DMRS SSS	to dB					
EPRE ratio of PBCH to PBC DMRS	H dB			0		
EPRE ratio of PSS to SSS	dB					
EPRE ratio of PDSCH DMRS	S to dB					
EPRE ratio of PDSCH to PD DMRS	SCH dB					
EPRE ratio of OCNG DMRS	to dB					
EPRE ratio of OCNG to OCN DMRS	NG dB					
SNR on Config 1	dB	1	-7	-15	-4.5	1
RLM-RS Config 2		1	-7	-15	-4.5	1

	Config 3		1	-7	-15	-4.5	1
$N_{oc}$	Config 1	dBm/15kHz	-98				
	Config 2		-98				
	Config 3		-98				
Propagatio	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.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 specified in section A.3.6.1.1.

Table A.6.5.1.6.1-4: Void

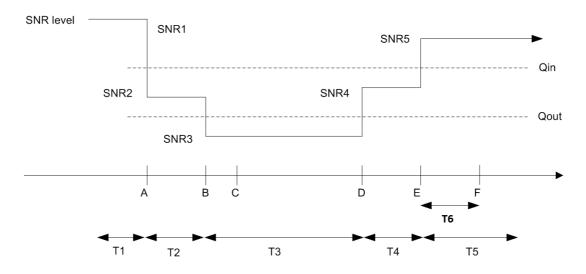


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

### 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 of 5ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Co	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.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter		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
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD
	Config 2		CCR.1.3 TDD
	Config 3		CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1

SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F	PDCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS	dB	4
	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 configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
T.	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1		S	1.24
Note 1: UE-specific	PDCCH is not transmitted after T1 st	arts.	

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB		4	
EPRE ratio of PDCCH to PDCCH DMRS	dB			
EPRE ratio of PBCH DMRS to SSS	dB			
EPRE ratio of PBCH to PBCH DMRS	dB		0	

EPRE ratio o	of PSS to SSS	dB			
EPRE ratio o	of PDSCH DMRS to	dB			
EPRE ratio of DMRS	of PDSCH to PDSCH	dB			
EPRE ratio o	of OCNG DMRS to	dB			
EPRE ratio of DMRS	of OCNG to OCNG	dB			
SNR on	Config 1	dB	1	-7	-15
RLM-RS	Config 2		1	-7	-15
	Config 3		1 -7 -15		-15
$N_{oc}$	Config 1	dBm/15kHz	-98		
	Config 2		-98		
	Config 3		-98		
Propagation	condition			TDL-C 300ns 100Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

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

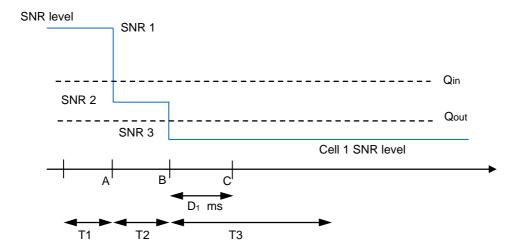


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

#### A.6.5.1.7.2 Test Requirements

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

During 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 of 5ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is	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
	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

RMSI CORESET	Config 1		CR.1.1 FDD
	Config 1		
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD
Reference Channel			
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F			TCI.State.0
OCNG parameters	-DCCH/FD3CH		OP.1
CP length			Normal
	Antonno Configuration		2x2 Low
Correlation Matrix and	Antenna Configuration		2X2 LOW
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols	005	
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE		
	energy		
	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			gp0
Layer 3 filtering			Enabled
T310 timer		ms	4000
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	4
T6		S	3.88
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Р	arameter	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio o	of PDCCH DMRS to	dB		•	0	'	
SSS							
EPRE ratio o	of PDCCH to PDCCH	dB					
DMRS							
	of PBCH DMRS to	dB					
SSS							
	of PBCH to PBCH	dB			0		
DMRS							
	of PSS to SSS	dB					
	of PDSCH DMRS to	dB					
SSS							
	of PDSCH to PDSCH	dB					
DMRS							
	of OCNG DMRS to	dB					
SSS	00000 ( 00000	15					
	of OCNG to OCNG	dB					
DMRS SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2	uБ	1	-7 -7	-15	-4.5 -4.5	1
IXLIVI-IXO			•	·		_	
	Config 3	ID (45111	1	-7	-15	-4.5	1
$N_{oc}$	Config 1	dBm/15kHz	-98				
υc	Config 2		-98				
Config 3					-98	01.1	
Propagation condition					L-C 300ns 10		
	CNG shall be used such			tully allocate	d and a const	ant total trans	mitted
DC	ower spectral density is a	achieved for all OFD	ivi 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 specified in section A.3.6.1.1[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

l —·	
Field	Toct 1
	I LEST I

		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

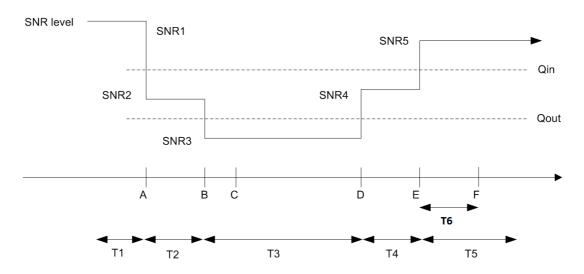


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

## 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 for NR PCell are shown in table A.6.5.2.1.1-1. Supported test configurations for NR SCell are shown in table A.6.5.2.1.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2, A.6.5.2.1.1-3 and A.6.5.2.1.1-4 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 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. 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 for NR PCell

Config	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1: The	UE is only required to be tested in one of the supported test configurations
ban	e UE is only required to be tested in one with smallest aggregated channel bandwidth from supported ad combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test figuration,

Table A.6.5.2.1.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

Configscell	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1: The	UE is only required to be tested in one of the supported test configurations
Note 2: The	UE is only required to be tested in one with smallest aggregated channel bandwidth from supported
band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test	
con	figuration,

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		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.6.5.2.1.1-3: NR cell specific test parameters for NR PCell for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter Frequency Range		Unit	Cell1
			FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
_	Config 2		TDDConf.1.1

I	Config 2	1	TDDConf 2.4
DW	Config 3		TDDConf.2.1
BW <sub>channel</sub>	Config 1,2	_	Note 9
DW	Config 3	DD	Note 9 52 Note 7
BW <sub>occupied</sub>	Config 1,2	RB	_
	Config 3		106 Note 8
Initial DL BWP	Config 1,2,3		DLBWP.0.1
Configuration			
Dedicated DL BWP	Config 1,2,3		DLBWP.1.1
Configuration	3 , , , .		LIL DIA/D 0.4
Initial UL BWP	Config 1,2,3		ULBWP.0.1
Configuration	J , ,		LILDWD 4.4
Dedicated UL BWP	Config 1,2,3		ULBWP.1.1
Configuration PDSCH Reference	_		CD 4.4 EDD
measurement channel	Config 1 Config 2	-	SR.1.1 FDD SR.1.2 TDD
measurement channel		_	
CCI DC for troolsing	Config 3		SR.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
DMCLCODECET	Config 3		TRS.1.2 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD
parameters	Config 2	_	CR.1.1 TDD
Dadianted CODECET	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1	-	CCR.1.1 FDD
parameters	Config 2	-	CCR.1.1 TDD
00110 B #	Config 3		CCR.2.1 TDD
OCNG Patterns	Config 1,2		OP.1 Note 8
01470 0 11	Config 3		
SMTC Configuration	0 " 10		SMTC.1
SSB Configuration	Config 1,2	-	SSB.1 FR1
O a malatian Matrix and Antan	Config 3		SSB.2 FR1
Correlation Matrix and Anter	nna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS	4- 000	_	
EPRE ratio of PBCH DMRS		_	
EPRE ratio of PBCH to PBC		_	
EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to PD		dB	0
EPRE ratio of PDSCH DMR		иь	0
EPRE ratio of PDSCH to PD		-	
EPRE ratio of OCNG DMRS		-	
EPRE ratio of OCNG to OCI	IC DMPS Note 1	-	
Noc Note 2	NG DIVING	dBm/15 kHz	104
SS-RSRP Note 3		dBm/15 kHz	-104 97
			-87 -17
Ê <sub>s</sub> /I <sub>ot</sub>		dB	17
$\hat{\mathbb{E}}_{s}/N_{oc}$ $N_{oc}^{Note 2}$ Config 1,2		dB	17
IN <sub>OC</sub>	Config 1,2	dBm/SCS	-104
Io <sup>Note3</sup>	Config 3	dPm/0.26MH=	-101 59.06
10.3355	Config 1,2	dBm/9.36MHz	-58.96
Time offset to Cell1 Note 5	Config 3	dBm/38.16MHz	-52.86
		μs	-
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 modeled as AWGN of appropriate power for N <sub>oc</sub> to be fulfilled within BW <sub>occupied</sub> .
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].
Note 7:	All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from Fc <sub>low</sub> , and lo is independent of the BW <sub>channel</sub> configured.
Note 8:	All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.
Note 9:	N <sub>RB,c</sub> . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW <sub>channel</sub> .

Table A.6.5.2.1.1-4: NR cell specific test parameters for NR SCell for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Configscell 1		FDD
	ConfigsCell 2,3		TDD
TDD configuration	Config <sub>SCell</sub> 1		Not Applicable
	ConfigsCell 2		TDDConf.1.1
	Confiqscell 3	İ	TDDConf.2.1
BWchannel	Configscell 1,2		Note 9
	Configscell 3		Note 9
BWoccupied	Configscell 1,2	RB	52 Note 7
	Configscell 3		106 Note 8
Initial DL BWP Configuration	ConfigsCell 1,2,3		DLBWP.0.1
Dedicated DL BWP Configuration	Configscell 1,2,3		DLBWP.1.1
Initial UL BWP Configuration	ConfigsCell 1,2,3		N/A
Dedicated UL BWP Configuration	Config 1,2,3		N/A
PDSCH Reference	Configscell 1		SR.1.1 FDD
measurement channel	Configscell 2		SR.1.2 TDD
	Configscell 3		SR.2.1 TDD
CSI-RS for tracking	Configscell 1		TRS.1.1 FDD
	Configscell 2		TRS.1.1 TDD
	Configscell 3		TRS.1.2 TDD
RMSI CORESET	Config <sub>SCell</sub> 1		CR.1.1 FDD
parameters	Configscell 2		CR.1.1 TDD
	Configscell 3		CR.2.1 TDD
Dedicated CORESET	Configscell 1		CCR.1.1 FDD
parameters	Configscell 2		CCR.1.1 TDD
	Config <sub>SCell</sub> 3		CCR.2.1 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 7
	Configscell 3		OP.1 Note 8
SMTC Configuration	SMTC Configuration		SMTC.4
SSB Configuration	ConfigsCell 1,2		SSB.5 FR1
_	Configscell 3		SSB.6 FR1
Correlation Matrix and An	Correlation Matrix and Antenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	S	dB	0

EPRE rat	tio of PBCH DMR	S to SSS		
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE rat	tio of PDCCH to P	DCCH DMRS		
EPRE rat	tio of PDSCH DMI	RS to SSS		
	tio of PDSCH to P			
	tio of OCNG DMR			
EPRE rat	tio of OCNG to OC	CNG DMRS Note 1		
N <sub>oc</sub> Note 2			dBm/15 kHz	-104
SS-RSRF	Note 3		dBm/15 kHz	-87
Ês/Iot			dB	17
Ê <sub>s</sub> /N <sub>oc</sub>			dB	17
Noc <sup>Note 2</sup>		Configscell 1,2	dBm/SCS	-104
		Config <sub>SCell</sub> 3		-101
Io <sup>Note3</sup>		Configscell 1,2	dBm/9.36MHz	-58.96
		Config <sub>SCell</sub> 3	dBm/38.16MHz	-52.86
Time offs	et to Cell1 Note 5		μs	3
Propagat	ion Condition			AWGN
Note 1:	OCNG shall be	used such that both	cells are fully alloca	ited and a constant total
		er spectral density is		
Note 2:				cified in the test is assumed to
				leled as AWGN of appropriate
		be fulfilled within B\		
Note 3:				arameters for information
Note 4:	void	are not settable par	ameters themselves	SS.
Note 4:		foranco hatwaan ak	at houndaries of sign	nals received from the two
Note 5.			•	ent error between the two
	cells.	intenna connector ii	icidaling time alignin	ient endi between the two
Note 6:	1			RWP DI RWP 0.2 is linked
with ULBWP.0.2 defined in clause 12				BVVI : BEBVVI :0.2 to till ikod
Note 7: All UL/DL transmission shall be confir				ed (i.e. 10 MHz, 52 RBs) from
F <sub>C,low</sub> , and lo is independent of the E				
Note 8:				ed (i.e. 40 MHz, 106 RBs) from
F <sub>C,low</sub> , and lo is independent of the E				
Note 9:	N <sub>RB,c</sub> . is derived	from Table 5.3.2-1	in TS38.101-1[2] wit	th configured BW <sub>channel</sub> .

#### A.6.5.2.1.2 Test Requirements

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-2.

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	2 + 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 for NR PCell are shown in table A.6.5.3.1.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.3.1.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. 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 and A.6.5.3.1.1-4 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  $n + \frac{T_{\text{HARQ}} + T_{\text{activation\_time}} + T_{\text{CSI\_Reporting}}}{NR \text{ slot length}}$ , as defined in clause 8.3. The UE shall start reporting CSI in PCell after at

least one CSI-RS transmission occasion for channel measurement and reporting after slot  $n + \frac{T_{\text{HARQ}} + 3\text{ms}}{\text{NR slot length}}$  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  $n + 1 + \frac{T_{\text{HARQ}}}{\text{NR slot length}}$  to  $n + 1 + \frac{T_{\text{HARQ}} + 3\text{ms} + T_{\text{X}}}{\text{NR slot length}} + N_{\text{interruption}}$ , as defined in clause 8.3, where  $N_{\text{interruption}}$  is the interruption length given in section 8.2.

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  $m + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot  $m + 1 + \frac{T_{HARQ}}{NR \ slot \ length}$  to  $m + 1 + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , 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 for NR PCell

Config Description		Description			
1 NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode			
2 NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode			
3	NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode				
Note 1:	ote 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supporte				
band combinations which is composed of CCs ≥ the bandwidth (BWchannel) defined in each test					
	configuration,				

Table A.6.5.3.1.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

Configscell Description		Description
1 NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode		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		s only required to be tested in one of the supported test configurations
Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test configuration,		

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
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
Т3	S	1	During this time the UE shall deactivate the SCell.
Tharq	ms	Config 1: 2 Config 2: 3 Config 3: 2.5	k <sub>1</sub> ×NR slot length  k <sub>1</sub> 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] that will meet the timing constraints of this test case.

ms 15 acquerefer CSI and avail	delay (in ms) including uncertainty in uiring the first available downlink CSI rence resource, UE processing time for reporting (clause 5.2.2.5 in TS 38.214) uncertainty in acquiring the first lable CSI reporting resources as cified in TS 38.331 [2]
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Table A.6.5.3.1.1-3: Cell specific test parameters for NR PCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Cell 1			
Parameter		Unit	T1	T2	Т3
Duplex mode	Config 1			FDD	
Daplex mode	Config 2,3			TDD	
	Config 1		Not applicable		
TDD configuration	Config 2		TDDConf.1.1		
	Config 3			TDDConf.2.1	
BWchannel	Config 1,2	MHz		Note 7	
	Config 3			Note 7	
BW <sub>occupied</sub>	Config 1,2	RB		52 Note 5	
LW LDWD C	Config 3			106 Note 6	
Initial BWP configuration				DLBWP.0.1	
TCI state	10 " 1			TCI.State.0	
TD0 0 (i	Config 1			TRS.1.1 FDD	
TRS Configuration	Config 2			TRS.1.1 TDD	
	Config 3			TRS.1.2 TDD	)
PDSCH Reference	Config 1			SR.1.1 FDD	
measurement channel	Config 2			SR.1.1 TDD	
	Config 3			SR.2.1 TDD	
Dedicated CORESET	Config 1			CCR.1.1 FDE	
parameters	Config 2			CCR.1.1 TDE	
	Config 3		CCR.2.1 TDD		)
RMSI CORESET	Config 1 Config 2		CR.1.1 FDD		
parameters	Config 3		CR.1.1 TDD		
OCNG Patterns	Config 1,2			CR.2.1 TDD OP.1 <sup>Note 5</sup>	
OCING Fallerins	Config 1,2			OP.1 Note 6	
	Config 1,2			SSB.1 FR1	
SSB Configuration	Config 1,2			SSB.2 FR1	
	Config 1			SI-RS.1.1 FD	ח
CSI-RS configuration for	Config 2			SI-RS.1.1 TD	
CSI reporting (Note 8)	Config 3			SI-RS.2.1 TD	
CMTC configuration	Coming 5				<u>'</u>
SMTC configuration				SMTC.1	
reportConfigType				periodic	
reportQuantity			(	ri-RI-PMI-CC	)l
CCI reporting a sale district	Config 1,2	slot		5	
CSI reporting periodicity	Config 3			10	
CCI non outin a official	Config 1,2	slot	3		
CSI reporting offset	Config 3			5	
EPRE ratio of PSS to SSS	<del>_</del>				
EPRE ratio of PBCH DMRS					
EPRE ratio of PBCH to PB					
EPRE ratio of PDCCH DMI	dB		0		
EPRE ratio of PDCCH to P					
EPRE ratio of PDSCH DMF	RS to SSS				
EPRE ratio of PDSCH to P	DSCH				

EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
$N_{oc}$ Note2		Config 1,2	dBm/SCS	-104	
1 v oc		Config 3	ubili/303	-101	
$\hat{E}_{s}/I_{ot}$			dB	17	
$\hat{E}_s/N_c$	ос		dB	17	
SS-RSRI	Note3	Config 1,2	dBm/SCS	-87	
		Config 3	ubili/SCS	-84	
SCH_RP	Note 3		dBm/15 kHz	-87	
Io Note3		Config 1,2	dBm/ 9.36MHz	-58.96	
10.10.00		Config 3	dBm/ 38.16MHz	-52.87	
Propagat	ion condition		-	AWGN	
Correlation	on Matrix and Anten	ina	_	2x2 Low	
Configura	ation		_	ZAZ LOW	
Note 1:				allocated and a constant total	
				all OFDM symbols.	
Note 2:				et specified in the test is assumed	
				be modelled as AWGN of	
	appropriate power	rfor $N_{oc}$ to be	tulfilled within B	Woccupied.	
Note 3:	SS-RSRP and SC	H_RP levels ha	ve been derived	from other parameters for	
	information purposes. They are not settable parameters themselves.				
Note 4:	Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of				
	time period T2.				
Note 5: All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 10 MHz, 52 RBs)					
from Fc,low, and lo is independent of the BW <sub>channel</sub> configured.					
Note 6:	Note 6: All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz, 106 RBs)				
Note 7:	from F <sub>C,low</sub> , and lo is independent of the BW <sub>channel</sub> configured.				
	Note 7: N <sub>RB,c</sub> . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW <sub>channel</sub> .				
Note 8:	Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI				
	reference resource timing definition in TS 38.214 cl. 5.2.2.5.				

Table A.6.5.3.1.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Parame	Unit	Cell 2			
Parame	ter	Offic	T1	T2	T3
Dunlay made	Config <sub>SCell</sub> 1		FDD		
Duplex mode	Configscell 2,3				
	Configscell 1		N	ot applicat	ole
TDD configuration	Configscell 2		Т	DDConf.1	.1
-	Config <sub>SCell</sub> 3		Т	DDConf.2	.1
BWchannel	Configscell 1,2	MHz		Note 7	
DVVchannel	Configscell 3	IVITIZ	Note 7		
BW <sub>occupied</sub>	Configscell 1,2	RB		52 Note 5	
	Configscell 3		106 Note 6		
Initial BWP configuration				DLBWP.0.	1
TCI state			•	TCI.State.0	)
	Configscell 1		Т	RS.1.1 FD	D
TRS Configuration	Configscell 2		Т	RS.1.1 TD	D
	Configscell 3		TRS.1.2 TDD		
PDSCH Reference	Configscell 1		N/A		
measurement channel	Configscell 2			N/A	
measurement channel	Config <sub>SCell</sub> 3			N/A	
Dedicated CORESET	Configscell 1			N/A	
parameters	Configscell 2			N/A	

	Caretia 2	-	NI/A		
	ConfigsCell 3		N/A		
RMSI CORESET	ConfigsCell 1		N/A		
parameters	ConfigsCell 2		N/A		
OONO Pattara	Configscell 3		N/A		
OCNG Patterns	ConfigsCell 1,2		OP.1 Note 5		
	Configscell 3,		OP.1 Note 6		
SSB Configuration	ConfigsCell 1,2		SSB.1 FR1		
- Col Collinguiation	Configscell 3		SSB.2 FR1		
CSI-RS configuration	Configscell 1		CSI-RS.1.1 FDD		
for CSI reporting Note 8	Configscell 2		CSI-RS.1.1 TDD		
io. co. repermig	Configscell 3		CSI-RS.2.1 TDD		
SMTC configuration			SMTC.1		
reportConfigType			N/A		
reportQuantity			N/A		
•	0				
CSI reporting	Configscell 1,2	slot	N/A		
periodicity	Config <sub>SCell</sub> 3	3101	N/A		
CSI reporting offset	Configscell 1,2	slot	N/A		
Correporting onset	Configscell 3	SIOL	N/A		
EPRE ratio of PSS to SS	S				
EPRE ratio of PBCH DM	RS to SSS				
EPRE ratio of PBCH to F					
EPRE ratio of PDCCH D					
EPRE ratio of PDCCH to		dB	0		
EPRE ratio of PDSCH D			-		
EPRE ratio of PDSCH to					
EPRE ratio of OCNG DM	IRS to SSS Note 1				
EPRE ratio of OCNG to					
$N_{oc}^{ m Note2}$	Configscell 1,2	-ID /000	-104		
IV oc	Configscell 3	dBm/SCS	-101		
$\hat{E}_{s}/I_{ot}$		dB	17		
$\hat{E}_s/N_{oc}$		dB	17		
	Configscell 1,2		-87		
SS-RSRP <sup>Note3</sup>	Configscell 3	dBm/SCS	-84		
SCH_RP Note 3	Cornigaces o	dBm/15 kHz	-87		
0011_1(1	ConfigsCell 1,2	dBm/	01		
Io Note3	Comigscell 1,2	9.36MHz	-58.96		
10 110100	Config <sub>SCell</sub> 3	dBm/	-52.87		
Daniel de la constitue		38.16MHz			
Propagation condition	- (	-	AWGN		
Correlation Matrix and All Configuration	ntenna		2x2 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 according to be fulfilled within BWoccupied.					
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 star					
of time period T2.  Note 5: All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 10 MHz, 52					
RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.					
Note 6: All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.					
Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW <sub>channel</sub>					

Note 8: On top of the reference configurations, CSI-RS offset should be set to meet the CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5.

### A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (n + 1 +  $\frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ ). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot n +  $\frac{T_{HARQ} + T_{activition\_time} + T_{CSI\_Reporting}}{NR \, slot \, length}$ ,  $T_{activation\_time} = T_{FirstSSB} + 5ms$ , as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot  $m + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot  $n+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$  to  $n+1+\frac{T_{\text{HARQ}+3\,\text{ms}+T_{\text{X}}}}{\text{NR slot length}}+N_{\text{interruption}}$ , as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot  $m + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$  to  $m + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , 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  $\frac{T_{HARQ} + T_{activtion\_time} + T_{CSI\_Reporting}}{NR \, slot \, length}$  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 640 ms 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, 640 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	640	

#### 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  $T_{FirstSSB\ MAX} + T_{rs} + 5ms$ .

#### 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  $\frac{T_{\text{HARQ}} + T_{\text{activition\_time}} + T_{\text{CSI\_Reporting}}}{NR \, slot \, length}, \text{ as defined in clause 8.3. The UE shall start reporting CSI in PCell after at least}$ 

one CSI-RS transmission occasion for channel measurement and reporting after slot  $n+1+\frac{T_{\text{HARQ}}+3ms}{NR \, \text{slot} \, \text{length}}$  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  $n+1+\frac{T_{\text{HARQ}}}{NR \, \text{slot} \, \text{length}}$  to  $m+1+\frac{T_{\text{HARQ}}+3ms+T_X}{NR \, \text{slot} \, \text{length}}+N_{\text{interruption}}$ , as defined in clause 8.3, where  $N_{\text{interruption}}$  is the interruption length given in section 8.2.

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  $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur in the slot  $n + 1 + \frac{T_{HARQ}}{NR \ slot \ length}$  to  $n + 1 + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , 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  $T_{FirstSSB\_MAX} + T_{SMTC\_MAX} + 2*T_{rs} + 5ms$  as defined in clause 8.3.

## A.6.5.4 UE UL carrier RRC reconfiguration Delay

### A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

#### Table A.6.5.4.1-1 - Table A.6.5.4.1-4: Void

#### A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode

9		30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth,				
		mode	TDD duplex mode;				
			SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex				
			mode				
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	The UE	The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band					
	combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test configuration,						

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
	Offic	configuration		
RF Channel		Config 1,2,3, 4,	1, 2	Two radio channels are used for these two
Number		5, 6, 7, 8, 9		tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement		Config 1,2,3, 4,	OFF	
gap pattern Id		5, 6, 7, 8, 9		
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		
T1		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Parameter	Unit	Test	Test 1	Test 2
		Configuration	T1 T2 T3	T1 T2 T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1	1
		Conf 1, 2, 3	N/A	N/A
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1	TDD Conf.1.1
		Conf 7, 8, 9	TDD Conf.2.1	TDD Conf.2.1
		Conf 1, 2, 3	Note 6	Note 6
BW <sub>channel</sub>	MHz	Conf 4, 5, 6	Note 6	Note 6
DW	DD	Conf 7, 8, 9	Note 6 52 Note 4	Note 6 52 Note 4
BW <sub>occupied</sub>	RB	Conf 1, 2, 3	52 Note 4	52 Note 4
		Conf 4, 5, 6 Conf 7, 8, 9	106 Note 5	106 Note 5
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD	SR.1.1 FDD
measurement		Conf 4, 5, 6	SR.1.1 TDD	SR.1.1 FDD SR.1.1 TDD
channel as defined in A.3.1.1		Conf 7, 8, 9	SR 2.1 TDD	SR 2.1 TDD
RMSI CORESET		Conf 1, 2, 3	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 4, 5, 6	CR.1.1 TDD	CR.1.1 TDD
measurement channel as defined in A.3.1.2		Conf 7, 8, 9	CR.2.1 TDD	CR.2.1 TDD
RMC CORESET		Conf 1, 2, 3	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 4, 5, 6	CCR.1.1 TDD	CCR.1.1 TDD
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	CCR.2.1 TDD	CCR.2.1 TDD
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6	OP.1 Note 4	OP.1 Note 4
		Config 7, 8, 9	OP.1 Note 5	OP.1 Note 5
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
		Conf 1	TRS.1.1 FDD	TRS.1.1 FDD
		Conf 2	TRS.1.1 FDD	TRS.1.1 FDD
		Conf 3 Conf 4	TRS.1.1 FDD TRS.1.1 TDD	TRS.1.1 FDD TRS.1.1 TDD
CSI-RS for tracking		Conf 5	TRS.1.1 TDD	TRS.1.1 TDD
SSI NO ISI TIAGKING		Conf 6	TRS.1.1 TDD	TRS.1.1 TDD
		Conf 7	TRS.1.2 TDD	TRS.1.2 TDD
		Conf 8	TRS.1.2 TDD	TRS.1.2 TDD
		Conf 9	TRS.1.2 TDD	TRS.1.2 TDD
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1	ULBWP.1.1
EPRE ratio of PSS to SSS  EPRE ratio of PBCH_DMRS to SSS  EPRE ratio of PBCH to PBCH_DMRS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	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_DMRS								
EPRE ratio of								
OCNG DMRS to								
SSS								
EPRE ratio of								
OCNG to OCNG								
DMRS	dDm /	C=mf 1 2 2 1		-102			-102	
No. 0	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9						
$N_{\!o}$ Note 2	dBm/	Conf	-102			-102		
	SCS	1,2,3,4,5,6				00		
A /		Conf 7,8,9	4.0	-99 16	4.0	4.0	-99 16	16
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16		16	16		
$\mathbf{\hat{E}}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
	SCS	Conf 7,8,9	-83	-83	-83	-83	-83	-83
	dBm/	Conf	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	9.36	1,2,3,4,5,6						
Io Note 3	MHz							
	dBm/	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	38.16 MHz							
				AWGN			AWGN	
Propagation		Conf 1, 2, 3, 4,		AWGN			AVVOIN	
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWON	
				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 within BW<sub>occupied</sub>.

NOTE 4: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.

NOTE 5: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.

NOTE 6: N<sub>RB,c</sub>. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	T3	T1	T2	Т3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		2			2	
		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		Note 6			Note 6	
BW <sub>channel</sub>	MHz	Conf 2, 5, 8		Note 6			Note 6	
		Conf 3, 6, 9		Note 6			Note 6	
BW <sub>occupied</sub>	RB	Conf 1, 4, 7		52 Note 4			52 Note 4	
		Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5			106 Note 5	
		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		G-FR1-	
Ì			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
			A3-10	in [13]	[13]	14/73	[13]	14/71
			in [13]				[.0]	
DU0011		Conf 2, 5, 8	G-	G-FR1-	G-FR1-		G-FR1-	
PUSCH parameters			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
for NR UL carrier			A3-10 in [13]	in [13]	[13]		[13]	
		Conf 3, 6, 9	G-	G-FR1-	G-FR1-			
		00111 0, 0, 0	FR1-	A3-14	A3-14 in		G-FR1-	
			A3-14	in [13]	[13]	N/A	A3-14 in	N/A
			in [13]		'-'		[13]	
		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]	14/73	14/73	14/71
		0 (0.5.0	[13]	[13]	<b>T</b> 1.1			
PUCCH parameters		Conf 2, 5, 8	Table	Table	Table 8.3.3.1.2			
For NR UL carrier			8.3.3.1 .2-1 in	8.3.3.1. 2-1 in	-1 in [13]	N/A	N/A	N/A
I OF INIX OL Camer			[13]	[13]	-1 111[13]			
		Conf 3, 6, 9	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N1/A	N1/A	N1/A
			.2-2 in	2-2 in	-2 in [13]	N/A	N/A	N/A
			[13]	[13]				
		Conf 1, 4, 7		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
DUOOLL		0(0.5.0		in [13]		[13]	[13]	[13]
PUSCH parameters for supplementary		Conf 2, 5, 8	N/A	G-FR1-	N/A	G-FR1-	G-FR1-	G-FR1-
UL			IN/A	A3-10 in [13]	IN/A	A3-10 in [13]	A3-10 in [13]	A3-10 in [13]
OL		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
		00111 0, 0, 0	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
				in [13]		[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
PUCCH parameters		Conf 2, 5, 8				Table	Table	Table
for supplementary			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
UL						-1 in [13]	-1 in [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
			,, .			-2 in [13]	-2 in [13]	-2 in [13]
<del>-</del>		Conf 1, 4, 7		SR.1.1 FD	D		SR.1.1 FDD	
	•							

		1		
PDSCH reference		Conf 2, 5, 8	SR.1.1 TDD	SR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined			SR 2.1 TDD	SR 2.1 TDD
in A.3.1.1				
RMSI CORESET		Conf 1, 4, 7	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 2, 5, 8	CR.1.1 TDD	CR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined			CR.2.1 TDD	CR.2.1 TDD
in A.3.1.2				
RMC CORESET		Conf 1, 4, 7	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 2, 5, 8	CCR.1.1 TDD	CCR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined		, , , ,	CCR.2.1 TDD	CCR.2.1 TDD
in A.3.1.3				
OCNG Pattern Note 1		Conf 1, 2, 4, 5,	OP.1 Note 4	OP.1 Note 4
OCNG Pattern New 1		7, 8		
		Conf 3, 6, 9	OP.1 Note 5	OP.1 Note 5
		Conf 1, 2, 4, 5,		
SSB configuration		7,8	SSB.1 FR1	SSB.1 FR1
J. 3		Conf 3, 6, 9	SSB.2 FR1	SSB.2 FR1
		Conf 1, 2, 3, 4,		
SMTC configuration		5, 6, 7, 8, 9	SMTC.1	SMTC.1
CSI-RS for tracking		5, 5, 7, 5, 5	Conf 1	TRS.1.1 FDD
2011 TO 101 tracking			Conf 2	TRS.1.1 TDD
			Conf 3	TRS.1.2 TDD
			Conf 4	TRS.1.1 FDD
			Conf 5	TRS.1.1 TDD
			Conf 6	TRS.1.1 TDD
			Conf 7	TRS.1.1 FDD
			Conf 8	TRS.1.1 TDD
DI : ::: I DIMB		0 (1 0 0 1	Conf 9	TRS.1.2 TDD
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		5, 6, 7, 8, 9		
EPRE ratio of PSS				
to SSS				
EPRE ratio of				
PBCH_DMRS to				
SSS				
EPRE ratio of PBCH				
to PBCH_DMRS				
EPRE ratio of				
PDCCH_DMRS to				
SSS				
EPRE ratio of	dB	Conf 1, 2, 3, 4,	0	0
PDCCH to	UD	5, 6, 7, 8, 9	l	
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								
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102	
Note 2	dBm/ SCS	Conf 1, 2, 4, 5, 7,8		-102		-102		
	303	Conf 3, 6, 9		-99			-99	
$\hat{E}_s/N_{oc}$	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_{ m s}/I_{ m ot}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	303	Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
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
IO More 2	dBm/ 38.16 MHz	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		1 x 2			1 x 2	

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled within BWoccupied.
- 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.
- NOTE 4: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and Io is independent of the BW<sub>channel</sub> configured.
- NOTE 5: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- NOTE 6: N<sub>RB,c</sub>. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

#### 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%.

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#### 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.6.5.5.1.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 1.

Table A.6.5.5.1.1-1: 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.6.5.5.1.1-2: 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	
	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	Config 1, 2,		ULBWP.0.1	
configuration	3			
UL dedicated BWP	Config 1, 2,		ULBWP.1.1	
configuration	3		OLDWI III	
Configuration	3			
TDD Configuration	Confin 4		Not Applicable	
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
RMSI CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
Tronorono onanno	Config 3		CR.2.1 TDD	
Dedicated				
	Config 1		CCR.1.1 FDD	
CORESET				
Reference Channel	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
oob comigaration	Config 2		SSB.3 FR1	
01/70 0 #	Config 3		SSB.4 FR1	
SMTC Configuration			SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 KHz	
	•			
subcarrier spacing	Config 3		30 KHz	
PRACH	Config 1, 2		Table A.3.8.2.2-1	
Configuration	Config 3		Table A.3.8.2.2-1	
SSB Index assigned	as BFD RS		0	
(q <sub>0</sub> )				
SSB Index assigned	as CBD RS		1	
(q <sub>1</sub> )				
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix an	d Antonno		2x2 Low	
	d Antenna		ZXZ LOW	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control	İ	_	
parameters	Control	4	_	
	OFDM		_	
paramotoro	OFDM			
parametere	OFDM symbols	CCE		
parametere	OFDM symbols Aggregation	CCE	8	
parameters	OFDM symbols Aggregation level			
parameter	OFDM symbols Aggregation level Ratio of	CCE dB	8	
parameter	OFDM symbols Aggregation level Ratio of hypothetical			
parameter	OFDM symbols Aggregation level Ratio of			
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE			
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to			
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS			
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of			
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS	dB	0	
parameter	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS	dB	0	
paramotore	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy Ratio of	dB	0	
paramotore	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy Ratio of	dB	0	
paramotore	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder	dB	0	
paramotore	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	0 REG bundle size	
paramotore	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle	dB	0	
DRX	OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	0 REG bundle size	

Gap pattern ID gp0 gapOffset 0 rlmlnSyncOutOfSyncThreshold absent	When the field is
gapOffset 0	
rlmInSyncOutOfSyncThreshold absent	
	absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB   Config 1, 2   dBm/ -98	Threshold
131p-1111e3floid00b Offing 1, 2 dbill/	used for
Config 3 SCS kHz -95	Q <sub>in_LR_SSB</sub>
powerControlOffsetSS db0	Used for deriving rsrp- ThresholdC SI-RS
beamFailureInstanceMaxCount n1	see clause 5.17 of TS 38.321 [ 7]
beamFailureDetectionTimer pbfd4	see clause 5.17 of TS 38.321 [ 7]
CSI-RS Config 1 CSI-RS.1.1 FDD	
configuration for Config 2 CSI-RS.1.1 TDD	
CSI reporting Config 3 CSI-RS.2.1 TDD	
CSI-RS for Config 1 TRS.1.1 FDD	
tracking Config 2 TRS.1.1 TDD	
Config 3 TRS.1.2 TDD	
SSB Index assigned as RLM RS 0, 1	
T310 Timer ms 1000	
N310 2	
T1 s 0.2	During this time the the UE shall be fully synchronize d 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	T3	T4	T5

EPRE ratio of PDCCH DMRS to SSS   dB	EDDE rotio o									
EPRE ratio of PBCH DMRS to SSS	EPRE ratio of PDCCH DMRS to SSS			dB	0					
EPRE ratio of PBCH to PBCH DMRS   dB				dB						
EPRE ratio of PSS to SSS	EPRE ratio of PBCH DMRS to SSS		dB							
EPRE ratio of PDSCH DMRS to SSS				-						
EPRE ratio of PDSCH to PDSCH DMRS         dB           EPRE ratio of OCNG DMRS to SSS         dB           EPRE ratio of OCNG to OCNG DMRS         dB           SNR_SSB of set q0         Config 1         dB         5         -3         -12         -12         -12           Config 2         5         -3         -12         -12         -12         -12           SNR_SSB of set q1         Config 1         dB         -10         -10         10         10         10           SNR_SSB of set q1         Config 1         dB         -10         -10         10<	EPRE ratio of PSS to SSS			dB						
EPRE ratio of OCNG DMRS to SSS   dB				dB						
SNR_SSB of set q0										
SNR_SSB of set q0				dB						
Config 2   5   -3   -12   -12   -12	EPRE ratio o	f OCNG	to OCNG DMRS	dB						
Config 3	SNR_SSB of	set q <sub>0</sub>	Config 1	dB				-12	-12	
SNR_SSB of set q1			Config 2				-12	-12		
Config 2			Config 3		5	-3	-12	-12	-12	
Config 3	SNR_SSB of	set q <sub>1</sub>		dB						
Config 1   Config 2   SCS kHz   -108   -108   -88   -88   -88   -88   -88   -88   -88   -88   -88   -88   -88   -88   -88   -105   -105   -105   -105   -8			Ŭ				10		10	
Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2 Config 2 Config 2 Config 3 Config 3 Config 2 Config 3 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 5 Config 5 Config 5 Config 5 Config 5 Config 6 Config 6 Config 6 Config 7 Con			Config 3		-10	-10	10	10	10	
Config 3  Config 1  Config 1  Config 2  Config 3  Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start	SSB_RP of s	et q <sub>1</sub>		4			-88	-88	-88	
Noc Config 1 dBm/15 HZ -98  Config 2 -98  Config 3 -98  Propagation condition TDL-C 300ns 100Hz  Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start				SCS kHz	-108	-108	-88	-88	-88	
Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start					-105	-105	-85	-85	-85	
Config 2 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	N	Config 1		-98						
Propagation condition  Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start	1 oc			KHz						
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										
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										
transmitted power spectral density is achieved for all OFDM symbols.  Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.  Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start										
Note 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								constant to	otal	
Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start										
or time period in.				guration for C	Si reporting	g are assigi	ied to the t	DE bliot to i	ne start	
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.										
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period									pariod	
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										
to the stand of a second supports the stands, the office during to is included as specified in	cla	3.6.			_					

Table A.6.5.5.1.1-4: Void

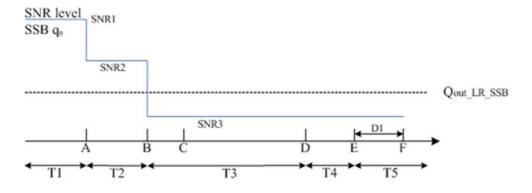


Figure A.6.5.5.1.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

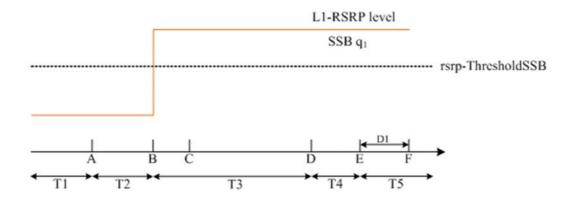


Figure A.6.5.5.1.1-2: L1-RSRP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

### A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

### A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set  $q_0$  configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set  $q_1$ . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set  $q_0$  in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period

when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration		Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3		TDD duplex mode, 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.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment	
Active PSCell			Test 1		
			Cell 1		
RF Channel Number			1		
Duplex mode	Config 1		FDD		
	Config		TDD		
	2, 3				
BWchannel	Config 1	MHz	10: NRB,c =		
			52		
	Config 2		10: NRB,c =		
			52		
	Config 3		40: NRB,c =		
			106		
DL initial BWP	Config		DLBWP.0.1		
configuration	1, 2, 3				
DI I II ( I DIA/D	0 "		DI DIVID 4 4		
DL dedicated BWP	Config		DLBWP.1.1		
configuration	1, 2, 3				
UL initial BWP	Config		ULBWP.0.1		
configuration	1, 2, 3		OLDVVI .O.1		
Comiguration	1, 2, 0				
UL dedicated BWP	Config		ULBWP.1.1		
configuration	1, 2, 3				
g	, _, -				
TDD Configuration	Config 1		Not		
			Applicable		
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
RMSI CORESET	Config 1		CR.1.1 FDD		
Reference Channel	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
Dedicated	Config 1		CCR.1.1		
CORESET			FDD		
Reference Channel	Config 2		CCR.1.1		
			TDD		
	Config 3		CCR.2.1	-	
			TDD		
SSB Configuration	Config 1		SSB.3 FR1		
	Config 2		SSB.3 FR1		
	Config 3		SSB.4 FR1		
SMTC Configuration	Config		SMTC.1		
	1, 2				

1	0 " 0	1	ON TO 1	T
	Config 3		SMTC.1	
PDSCH/PDCCH	Config		15 KHz	
subcarrier spacing		4		
	Config 3		30 KHz	
PRACH	Config		Table	
Configuration	1, 2		A.3.8.2.2-1	
	Config 3	1	Table	
3			A.3.8.2.2-1	
SSB Index assign	ed as BFD RS		0	
(q <sub>0</sub> )				
SSB Index assign	ed as CBD RS		1	
(q <sub>1</sub> )			·	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix	and Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control		_	
parameters	OFDM			
paramotoro	symbols			
	Aggregation	CCE	8	
	level	OOL		
	Ratio of	dB	0	
	hypothetical	G D		
	PDCCH RE			
	energy to			
	average SSS			
	RE energy			
	Ratio of	dB	0	
	hypothetical	u.D	Ĭ	
	PDCCH			
	DMRS			
	energy to			
	average SSS			
	RE energy			
	DMRS		REG bundle	
	precoder		size	
	granularity		5.25	
	REG bundle		6	
	size			
DRX	, - <del></del>		DRX.7	A.3.3.7
Gap pattern ID			N.A.	7
rlmInSyncOutOfS	vncThreshold		Absent	When the
	,		7.050110	field is
				absent, the
				UE applies
				the value 0.
				(Table 8.1.1-
				1).
rsrp-	Config 1, 2	dBm/S	-98	Threshold
ThresholdSSB	20ig 1, 2	CS kHz		used for
THEORIGIAGES	Config 3	00 11112	-95	Qin_LR_SSB
powerControlOffs	etSS		db0	Used for
				deriving
				rsrp-
				ThresholdC
				SI-RS
beamFailureInsta	nceMaxCount		n1	see
				clause 5.17

				of
				TS 38.321 [7
				]
beamFailureDete	ctionTimer		pbfd4	see
				clause 5.17
				of
				TS 38.321 [7
CSI-RS	Config 1		CSI-RS.1.1	<u> </u>
configuration for	Comig		FDD	
CSI reporting			100	
	Config 2		CSI-RS.1.1	
			TDD	
	Config 3		CSI-RS.2.1	
			TDD	
CSI-RS for	Config 1		TRS.1.1	
tracking			FDD	
	Config 2		TRS.1.1	
			TDD	
	Config 3		TRS.1.2	
			TDD	
SSB Index			0, 1	
assigned as				
RLM RS				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this
				time the the
				UE shall be
				fully
				synchronize
To			F 47	d to cell 1
T2 T3		S	5.17 3.24	
T4		S	3.24	
T5		S S	1.97	
D1		_		
Note 1: All confi		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	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB			0		
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					
EPRE ratio of PDSCH DMRS to SSS	dB					
EPRE ratio of PDSCH to PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS	dB					
SNR SSB of set q <sub>0</sub> Config 1	dB	5	-3	-12	-12	-12

	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
SSB_RP of set q <sub>1</sub>	Config 1	dBm/	-108	-108	-88	-88	-88
	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
$N_{oc}$	Config 1	dBm/15	-98				
<sup>1</sup> V <sub>oc</sub>		KHz					
	Config 2		-98				
	Config 3				-98		·
Propagation condition		TDL-C 300ns 100Hz				·	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.2.1-4: Void

Table A.6.5.5.2.1-5: Void

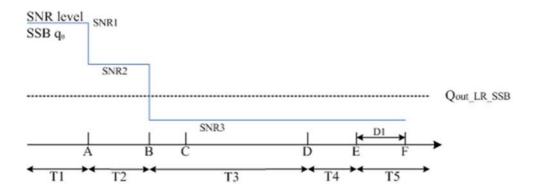


Figure A.6.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in DRX mode

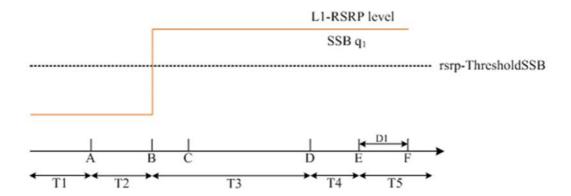


Figure A.6.5.5.2.1-2: L1-RSRP level variation for SSB-based beam failure detection and link recovery testing in DRX mode

## 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.6.5.5.3.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Co	nfiguration	Description			
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
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	
J	Config 3		TDDConf.2.1	
RMSI	Config 1		CR.1.1 FDD	A.3.1.2
CORESET	S			
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	A.3.1.3
CORESET	G			
Reference	Config 2		CCR.1.1 TDD	
Channel	Config 3		CCR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
Ü	Config 3		SSB.4 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	
PDSCH/PDC	Config 1, 2		15 KHz	
CH subcarrier	Config 3		30 KHz	
spacing	3 -			
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration	<b>G</b> , ,		configuration 4	
csi-RS-Index as	ssigned as beam		0	
failure detection	n RS in set q₀			
OCNG paramet	ters		OP.1	A.3.2.1
CP length			Normal	
	rix and Antenna		2x2 Low	
Configuration				
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 p			REG bundle size	
	granulari		ļ	0	
DDV	REG bur	idle size	<del> </del>	6	
DRX			<del> </del>	OFF	
Gap pattern ID	'	11 .1		N.A.	N
csi-RS-Index as				1	N
beam detection rlmInSyncOutOf	KS III Set t	<u> </u>		absent	When the field is
filminayncoulor	Syncrines	snoia		abseni	absent, the UE
					applies the value 0.
					(Table 8.1.1-1).
rsrp-	Config 1	2	dBm/	-98	Threshold used for
ThresholdCSI-	Config 3		SCS	-95 -95	Qin_LR_CSI-RS
RS	Ourning 5		kHz	-50	✓IN_LK_USI-KS
powerControlOff	fsetSS		IXI IZ	db0	Used for deriving
pomoresmas	100.00			<b>4.2</b> 5	rsrp-ThresholdCSI-
					RS
beamFailureInst	tanceMaxC	Count		n1	see clause 5.17 of
					TS 38.321 [7]
beamFailureDet	ectionTime	er		pbfd4	see clause 5.17 of
				•	TS 38.321 [7]
CSI-RS configur	ration for	Config 1		CSI-RS.1.2 FDD	A.3.14
q₀ and q₁		Config 2	1	CSI-RS.1.2 TDD	
		Config 3	1	CSI-RS.2.2 TDD	
CSI-RS configur	ration for	Config 1		CSI-RS.1.1 FDD	A.3.14
CSI reporting		Config 2		CSI-RS.1.1 TDD	7
		Config 3		CSI-RS.2.1 TDD	
TRS configuration	on	Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.1 TDD	
		Config 3		TRS.1.2 TDD	
CSI-RS-Index as	ssigned	Config 1		CSI-RS.1.2 FDD	A.3.14
as RLM RS		Config 2	<u> </u>	CSI-RS.1.2 TDD	
		Config 3		CSI-RS.2.2 TDD	
T310 Timer			ms	1000	
N310				2	
T1	_		s	0.2	During this time the
				the UE shall be	
				fully synchronized	
To		<b></b>	- 10	to cell 1	
T2		S	0.18		
T3		S	0.14		
T4			S	0	
T5			S	0.08	
D1	-'t' - DD:	00111	S	0.04	
Note 1: UE-s	pecific Pu	CCH is not tra	insmitted an	ter 11 starts.	
1					

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 PDCCH DMRS to SSS	dB	0				
EPRE ratio of PDCCH to PDCCH DMRS	dB	1				

EPRE ratio of PBCI	dB						
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS	to SSS	dB					
EPRE ratio of PDS0	CH DMRS to SSS	dB					
EPRE ratio of PDS0	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	G DMRS to SSS	dB					
EPRE ratio of OCN	G to OCNG DMRS	dB					
SNR_CSI-RS of	Config 1	dB	5	-3	-12	-12	-12
set q <sub>0</sub>	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of	Config 1	dB	-10	-10	10	10	10
set q <sub>1</sub>	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set	Config 1	dBm/	-108	-108	-88	-88	-88
<b>q</b> 1	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
$N_{oc}$	Config 1	dBm/15 KHz			-98		
Config 2		1	-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							

- 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: Void
- 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 REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.3.1-4: Void

Table A.6.5.5.3.1-5: Void

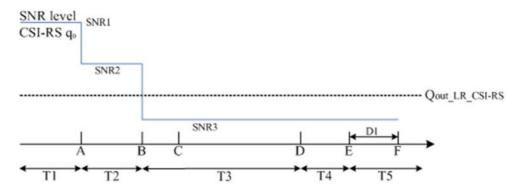


Figure A.6.5.5.3.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

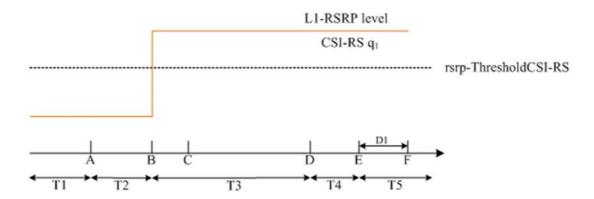


Figure A.6.5.5.3.1-2: L1-RSRP level variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

#### A.6.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

# A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q<sub>0</sub> configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q<sub>1</sub>. 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.6.5.5.4.1-2 shows the variation of the downlink L1-RSRP 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 5 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

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, 30 kHz SSB SCS, 40 MHz bandwidth
Note: T	he UE is only r	equired 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 Test 1	Comment
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf21	
RMSI 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	
Dedicated CORESET	Config 1		CCR.1.1 FDD	A.3.1.3
Reference	Config 2		CCR.1.1 TDD	
Channel	Config 3		CCR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
3	Config 3		SSB.4 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	
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration	301mg 1, 2, 3		configuration 4	71.0.0.2
	ned as beam failure		0	
detection RS in set				
OCNG parameters	I-		OP.1	A.3.2.1
CP length			Normal	-
Correlation Matrix a	ind Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
	symbols			
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI-RS	dB	0	
	RE energy			

	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			DRX.7	A.3.3.7			
Gap pattern ID			N.A.				
csi-RS-Index assigne	ed as candidate		1				
beam detection RS ir							
rlmInSyncOutOfSync			absent	When the field is			
, ,				absent, the UE			
				applies the value 0.			
				(Table 8.1.1-1).			
rsrp-ThresholdCSI-	Config 1, 2	dBm/	-98	Threshold used for			
RS							
	Config 3	SCS kHz	-95	Qin LR CSI-RS			
powerControlOffsetS	powerControlOffsetSS		db0	Used for deriving			
			3.50	rsrp-ThresholdCSI-			
				RS			
beamFailureInstance	MaxCount		n1	see clause 5.17 of			
				TS 38.321 [7]			
beamFailureDetection	nTimer		pbfd4	see clause 5.17 of			
			para.	TS 38.321 [7]			
CSI-RS	Config 1		CSI-RS.1.2 FDD	A.3.14			
configuration				.1			
for q <sub>0</sub> and q <sub>1</sub>	Config 2		CSI-RS.1.2 TDD				
101 40 0010 41	Config 3		CSI-RS.2.2 TDD				
CSI-RS	Config 1		CSI-RS.1.1 FDD	A.3.14.1			
configuration	Config 2		CSI-RS.1.1 TDD	71.0.1 1.1			
for CSI reporting	Config 3		CSI-RS.2.1 TDD				
TRS	Config 1		TRS.1.1 FDD				
configuration							
Comiguration	Config 2 Config 3		TRS.1.1 TDD TRS.1.2 TDD				
CSI-RS-Index	Config 1		CSI-RS.1.2 FDD				
assigned as	Config 2		CSI-RS.1.2 FDD				
			CSI-RS.1.2 TDD				
T310 Timer	RLM RS Config 3		4000				
		ms	1000				
N310			2	During this times the			
T1		S	1	During this time the			
				the UE shall be			
				fully synchronized			
То		S	0.07	to cell 1			
	T2		8.37				
T3		S	6.44				
T4		S	0				
T5		S	1.97				
D1	• DDOOLL's seek	S	1.93				
Note 1: UE-specific PDCCH is not transmitted after T1 starts.							

Table A.6.5.5.4.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMI	RS to SSS	dB			0		
EPRE ratio of PDCCH to P	DCCH DMRS	dB					
EPRE ratio of PBCH DMRS	3 to SSS	dB					
EPRE ratio of PBCH to PB	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB					
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 <sub>0</sub>	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set q <sub>1</sub>	Config 1	dB/	-110	-110	-88	-88	-88
	Config 2	SCS kHz	-110	-110	-88	-88	-88
	Config 3		-107	-107	-85	-85	-85
$N_{oc}$	Config 1	dBm/15 KHz			-98		
		-98					
		-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 res		guration for C	SI reportin	g are assigi	ned to the l	JE prior to	the start
Note 4: Void							
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period							

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 REs carrying CSI-RS.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

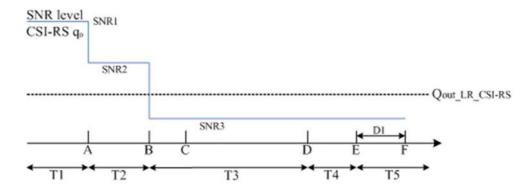


Figure A.6.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

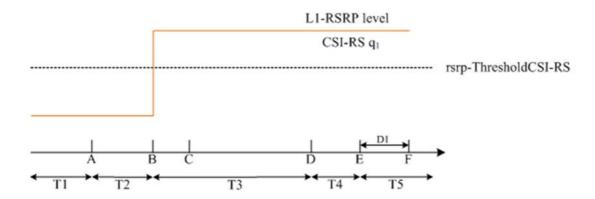


Figure A.6.5.5.4.1-2: L1-RSRP level variation for CSI-RS based beam failure detection and link recovery testing in DRX mode

# 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 SCell 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 for PCell are shown in Table A.6.5.6.1.1.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.6.1.1.1-1A below. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. The test scenario comprises of one NR PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 and Table A.6.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (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.

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 Cell 2 (SCell) on radio channel 2 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, 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 PCell, BWP-0 in Cell 1 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.
- UE is configured with a bwp-InactivityTimer timer value for SCell.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell'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 first DL slot that occurs after the beginning of SCell's DL slot ( $i+T_{BWPswitchDelay}$ ) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}+k_1$ ). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}$ ).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

#### During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after 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 first DL slot that occurs after the beginning of SCell's slot ( $j+T_{BWPswitchDelay}$ ) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ( $j+T_{BWPswitchDelay}+k_1$ ). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ( $j+T_{BWPswitchDelay}$ ).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations for NR PCell

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	s only required to be tested in one of the supported test configurations
Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from support band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test		
	configura	

Table A.6.5.6.1.1.1-1A: DL BWP switch supported test configurations for NR SCell

Conf	ig <sub>SCell</sub>	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	s only required to be tested in one of the supported test configurations
Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from suppor band combinations which is composed of CCs ≥ the bandwidth (BW <sub>channel</sub> ) defined in each test configuration,		

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this 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	μѕ	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 A.6.5.6.1.1.1-3: NR Cell specific test parameters for NR PCell for DL BWP switch in SA

Parameter		Unit	Cell 1
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 <sub>channel</sub>	Config 1,2		Note 7
	Config 3		Note 7
BWoccupied	Config 1,2	RB	52 Note 5
	Config 3		106 Note 6
Active BWP ID			0
Initial DL BWP Configura	ation		DLBWP.0.2 <sup>Note4</sup>
Initial UL BWP Configura	ation		ULBWP.0.2 <sup>Note4</sup>
Active DL BWP-0 Config	uration		DLBWP.0.2 <sup>Note4</sup>
Active DL BWP-1 Config	uration		N.A.
Active DL BWP-2 Config	uration		N.A.
Active UL BWP-0 Config	uration		ULBWP.0.2 <sup>Note4</sup>
Active UL BWP-1 Config	uration		N.A.
Active UL BWP-2 Config	uration		N.A.
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.2 FDD
parameters	Config 2		CCR.1.2 TDD
	Config 3		CCR.2.4 TDD
TRS Configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
20112	Config 3		TRS.1.2 TDD
OCNG Patterns	Config 1,2		OP.1 Note 5
000 0 " "	Config 3		OP.1 Note 6
SSB Configuration	Config 1,2	_	SSB.1 FR1
CMTC Configuration	Config 3		SSB.2 FR1
	SMTC Configuration		SMTC.1
Configuration			1x2 Low
Configuration  EPRE ratio of PSS to SSS		dB	0
EPRE ratio of PBCH DMRS to SSS		"	3
EPRE ratio of PBCH to PBCH DMRS		=	
EPRE ratio of PDCCH DMRS to SSS		┥	
EPRE ratio of PDCCH to PDCCH DMRS		┪ !	
EPRE ratio of PDSCH DMRS to SSS		1	
EPRE ratio of PDSCH to		1	
LEIVE 19110 OLEDOCH 10 EDOCH			ļ

EPRE ra	EPRE ratio of OCNG DMRS to SSS(Note		1	
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Noc Note 2		Config 1,2	dBm/SCS	-104
		Config 3		-101
Noc Note 2			dBm/15KHz	-104
SS-RSRI	Note 3	Config 1,2	dBm/SCS	-87
		Config 3		-84
Ê <sub>s</sub> /I <sub>ot</sub>			dB	17
Ê <sub>s</sub> /N <sub>oc</sub>			dB	17
Io <sup>Note3</sup>			dBm/	-58.96
		Config 1,2	9.36MHz	
		Config 3	dBm/	-52.86
		38.16MHz		
Propagation Condition			AWGN	
Note 1: OCNG shall be used such that bot				
	total transmitted power spectral de			
Note 2:				•
	assumed to be constant over subcarriers and			
		ropriate power for N		
Note 3		l lo levels have bee		•
Nata 4.	•	irposes. They are no	•	
Note 4:	Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is			
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is			,
Note 5:	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			
Note 5.				
Note 6:	RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.			•
INOLE U.	All UL/DL transmission shall be confined within BW <sub>occupied</sub> (i.e. 40 MHz, 106 RBs) from F <sub>C,low</sub> , and Io is independent of the BW <sub>channel</sub> configured.			
Note 7:	, ·			
14016 7.	INRB,c. IS delived from Table 5.5.2-1 in 1536.101-1[2] with configured BW channel.			

Table A.6.5.6.1.1.1-4: NR Cell specific test parameters for NR SCell for DL BWP switch in SA

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config <sub>SCell</sub> 1		FDD
	Configscell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
	ConfigsCell 2		TDDConf.1.1
	Configscell 3		TDDConf.1.2
BW <sub>channel</sub>	Configscell 1,2		Note 7
	Configscell 3		Note 7
BW <sub>occupied</sub>	Configscell 1,2	RB	52 Note 5
	Configscell 3		106 Note 6
Active BWP ID			1, 2
Initial DL BWP Configuration	on		DLBWP.0.2 <sup>Note4</sup>
Initial UL BWP Configuration	on		N.A.
Active DL BWP-0 Configur	ation		N.A.
Active DL BWP-1 Configur	ation		DLBWP.1.1 <sup>Note4</sup>
Active DL BWP-2 Configuration			DLBWP.1.3 <sup>Note4</sup>
Active UL BWP-0 Configuration			N.A.
Active UL BWP-1 Configuration			N.A.
Active UL BWP-2 Configuration			N.A.
PDSCH Reference Configscell 1			SR.1.1 FDD

	0 " -	1	00.4.4.700
measurement channel	ConfigsCell 2		SR.1.1 TDD
	Configscell 3		SR.2.1 TDD
RMSI CORESET	Configscell 1		CR.1.1 FDD
parameters	Configscell 2		CR.1.1 TDD
	Configscell 3		CR.2.1 TDD
Dedicated CORESET	Config <sub>SCell</sub> 1		CCR.1.2 FDD
parameters	Config <sub>SCell</sub> 2		CCR.1.2 TDD
	Configscell 3		CCR.2.4 TDD
TRS Configuration	Configscell 1		TRS.1.1 FDD
	Configscell 2		TRS.1.1 TDD
	Configscell 3		TRS.1.2 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 5
	ConfigsCell 3		OP.1 Note 6
SSB Configuration	Configscell 1,2		SSB.1 FR1
S	Configscell 3		SSB.2 FR1
SMTC Configu			SMTC.1
Correlation Matrix ar			1x2 Low
Configuration	on		
EPRE ratio of PSS		dB	0
EPRE ratio of PBCH D	MRS to SSS		
EPRE ratio of PBCH to			
EPRE ratio of PDCCH I			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH			
EPRE ratio of OCNG DM			
EPRE ratio of OCNG to O	CNG DMRS Note 1		
Noc <sup>Note 2</sup>	Configscell 1,2	dBm/SCS	-104
	Configscell 3		-101
N <sub>oc</sub> Note 2	o o goodii o	dBm/15KHz	-104
SS-RSRP Note 3	Configscell 1,2	dBm/SCS	-87
CO NON	Configscell 3	dBiii/000	-84
Ê <sub>s</sub> /I <sub>ot</sub>	Cornigscen 5	dB	17
Es/Tot Ês/Noc		dB	17
Io <sup>Note3</sup>		dBm/	-58.96
10	Configscell 1,2	9.36MHz	-36.90
	Comigscell 1,2	9.3000112	
	Configscell 3	dBm/	-52.86
	301g3006ii 0	38.16MHz	
Propagation Condition			AWGN
Note 1: OCNG shall be	used such that bot	th cells are fully a	allocated and a constant

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.
- 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].
- Note 5: All UL/DL transmission shall be confined within BW<sub>occupied</sub> (i.e. 10 MHz, 52 RBs) from F<sub>C,low</sub>, and lo is independent of the BW<sub>channel</sub> configured.
- Note 6: All UL/DL transmission shall be confined within BW $_{occupied}$  (i.e. 40 MHz, 106 RBs) from F $_{c,low}$ , and Io is independent of the BW $_{channel}$  configured.
- Note 7: N<sub>RB,c</sub>. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW<sub>channel</sub>.

#### A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k_1)$ .

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k_1)$ .

Where, k<sub>1</sub> 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 SCell 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 PCell interruption during SCell 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 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell 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/NACK in the first UL slot that occurs after the beginning of DL slot ( $i+T_{BWPswitchDelay}+k_1$ ), ( $j+T_{BWPswitchDelay}+k_1$ ), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

# 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.

The supported test configurations are shown in Table A.6.5.6.1.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the 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.

The cell has 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 on the first DL slot that occurs after the beginning of 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 first UL slot that occurs after the beginning of slot  $(i+T_{BWPswitchDelay}+k1)$ . The UE shall be continuously scheduled on Cell1's BWP-2 starting from the first DL slot that occurs after the beginning of 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 first slot of the subframe immediately after 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 on the first DL slot that occurs after the beginning of Cell1's slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+kI)$ . The UE shall be continuously scheduled on Cell1's BWP-1 starting from the first DL slot that occurs after the beginning of 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/NACK 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 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	e 1: The UE is only required to be tested in one of the supported test configurations.	
Note 2:	A UE which fulfil	s the requirements in test case A.6.5.6.1.1 can skip the test cases in A.6.5.6.1.2.

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
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.2.1
BW <sub>channel</sub>	Config 1		10 MHz: N <sub>RB,c</sub> = 52

	Config 2	1	10 MHz: N== = 52
	Config 2 Config 3		10 MHz: N <sub>RB,c</sub> = 52 40 MHz: N <sub>RB,c</sub> = 106
Active BWP ID			1, 2
Initial DL RWP			DLBWP.0.2 Note 4
Configuration	Config 1,2,3		DEBWF.0.2
Active DL BWP-1			DLBWP.1.1 Note 4
	Config 1,2,3		DLBWP.1.1 ****
Configuration			DLBWP.1.3 Note 4
Active DL BWP-2	Config 1,2,3		DLBWP.1.3***
Configuration Initial UL BWP			ULBWP.0.2 Note 4
	Config 1,2,3		ULBVVP.0.2****
Configuration Active UL BWP-1			ULBWP.1.1 Note 4
Configuration	Config 1,2,3		OLBWP.1.1
Active UL BWP-2	-		N/A
Configuration	Config 1		IN/A
Configuration	-		ULBWP.1.3 Note 4
	Config 2,3		ULBWP.1.3***
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2	-	SR.1.1 TDD
measurement chailler		1	
RMSI CORESET	Config 3 Config 1	+	SR.2.1 TDD CR.1.1 FDD
		4	
parameters	Config 2	-	CR.1.1 TDD CR.2.1 TDD
Dedicated CORESET	Config 3		I control of the cont
	Config 1	_	CCR.1.2 FDD
parameters	Config 2	_	CCR.1.2 TDD
OONO Dellama	Config 3		CCR.2.4 TDD
OCNG Patterns	0 " 10		OP.1
SSB Configuration	Config 1,2		SSB.1 FR1
01470 0 11	Config 3		SSB.2 FR1
SMTC Configuration			SMTC.1
Correlation Matrix and	Antenna		1x2 Low
	Configuration		TDC 4.4 EDD
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
EDDE # 1 1 DOO 1 6	Config 3,6	I.D.	TRS.1.2 TDD
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS		dB	0
		_	
EPRE ratio of PBCH to		_	
EPRE ratio of PDCCH		_	
EPRE ratio of PDCCH		_	
EPRE ratio of PDSCH		_	
EPRE ratio of PDSCH		4	
EPRE ratio of OCNG D	NIKS to SSS(Note		
1)	OONO DMDC	_	
EPRE ratio of OCNG to OCNG DMRS			
(Note 1) N <sub>oc</sub> Note 2			104
IN <sub>OC</sub>	Config 1,2	dBm/SCS	-104
N.I. Note 2	Config 3	JD (4=:::	-101
Noc <sup>Note 2</sup>		dBm/15kH	-104
CC DCDD Note 3	Carfin 4.0	Z dDm/CCC	0.7
SS-RSRP Note 3	Config 1,2	dBm/SCS	-87
<b>A</b> //	Config 3		-84
Ê <sub>s</sub> /lot		dB	17
Ë <sub>s</sub> /N <sub>oc</sub>		dB dBm/	17
10 <sup>NOTES</sup>	Io <sup>Note3</sup> Config 1,2		-58.96
	<b>J</b> ,	9.36MHz	50.00
	Config 3	dBm/	-52.86
Dropogotica Condition	ŭ	38.16MHz	AMCN
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

#### A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+kI)$ .

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of 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 Cell1 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/NACK in the first UL slot that occurs after beginning of 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/NACK.

#### A.6.5.6.2 RRC-based Active BWP Switch

# A.6.5.6.2.1 NR FR1 DL active BWP switch of Cell 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.

The supported test configurations are shown in Table A.6.5.6.2.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of Cell are specified in Table A.6.5.6.2.1.1-3 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 has bandwidth part BWP-1 in its RRC-configuration for Cell 1.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in Cell

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

#### During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in Cell's slot # denoted i. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$  as defined in clause 8.6.3 and starts to report valid ACK/NACK

for the PCell from the first UL slot that occurs after the beginning of DL slot i +

 $\frac{r_{RRCprocessingDelay} + r_{BWPswitchDelayRRC}}{NR \ Slot \ length} + k1 \quad on \ BWP-1 \ of \ final \ condition. \ The \ UE \ shall \ be \ continuously$ 

scheduled on PCell's BWP-1 starting from the the first DL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}$ 

NR Slot length

 $T_{RRCprocessingDelay}$  and  $T_{BWPswitchDelayRRC}$  are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations in SA scenario

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 r	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 SA scenario

Parameter	Unit	Value	Comment		
NR RF Channel Number		1 One NR radio channel is used for th			
Active Cell		Cell 1	Cell on RF channel number 1.		
CP length		Normal			
DRX		OFF			
T1	S	0.2			

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

Paran	neter	Unit	Cell 1
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.2.1
BW <sub>channel</sub>	Config 1		10 MHz: N <sub>RB,c</sub> = 52
	Config 2		10 MHz: N <sub>RB,c</sub> = 52
	Config 3		40 MHz: N <sub>RB,c</sub> = 106
Active BWP ID			1
Initial DL BWP	Config 1,2, 3		DLBWP.0.2
Configuration			
Initial UL BWP	Config 1,2, 3		ULBWP.0.2
Configuration			

	T	1	1	
Initial	Active DL	Config 1, 2, 3		DLBWP.1.3
Condition	BWP-1			
	Configurat			
	ion			
	Active UL	Config 1, 2, 3		ULBWP.1.3
	BWP-1			
	Configurat			
	ion	0 " 1 0 0		DI DIVID 4 4
Final	Active DL	Config 1, 2, 3		DLBWP.1.1
Condition	BWP-1			
	Configurat			
	ion			
	Active UL	Config 1, 2, 3		ULBWP.1.1
	BWP-1			
	Configurat			
	ion			
PDSCH Re		Config 1		SR.1.1 FDD
measureme	ent channel	Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
RMSI COR	ESET	Config 1		CR.1.1 FDD
parameters		Config 2		CR.1.1 TDD
		Config 3		CR2.1 TDD
Dedicated 0	CORESET	Config 1		CCR.1.2 FDD
parameters		Config 2		CCR.1.2 TDD
		Config 3		CCR.2.4 TDD
OCNG Patt	erns			OP.1
SSB Config	uration	Config 1,2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Conf	iguration			SMTC.1
TRS Config		Config 1		TRS.1.1 FDD
		Config 2		TRS.1.1 TDD
		Config 3		TRS.1.2 TDD
Antenna Co	nfiguration			1x2 Low
Propagation				AWGN
	of PSS to SS	S	dB	0
	of PBCH DM			•
	of PBCH to F			
	of PDCCH D			
		PDCCH DMRS		
	of PDSCH DI			
	of PDSCH to			
EPRE ratio	of OCNG DM	IRS to SSS <sup>(Note 1)</sup>		
EPRE ratio	of OCNG to (	OCNG DMRS <sup>(Note</sup>	1	
1)	J. 20.40 to t	JOING BINING		
N <sub>oc</sub> Note 2		Config 1,2	dBm/SCS	-104
1,400		Config 3	1 32, 333	-101
SS-RSRP <sup>N</sup>	ote 3	Config 1,2	dBm/SCS	-87
30-10101°		Config 3	dbiii/303	-84
Ê <sub>s</sub> /I <sub>ot</sub>		Corning 3	dB	-0 <del>4</del> 17
Ê <sub>s</sub> /N <sub>oc</sub>		Config 1.2	dB dBm/	17 59.06
10,1000		Config 1,2	dBm/	-58.96
		Config 3	9.36MHz dBm/	-52.86
		Corning 3		-52.80
		1	38.16MHz	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N <sub>∞</sub> to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

#### A.6.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the PCell from the first DL slot that occurs right after the beginning of slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$  and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$ .

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.6 Measurement procedure

# A.6.6.1 Intra-frequency Measurements

# A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

# A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

# A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

Co	onfiguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only 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 serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	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 TDDConf.1.1		TDDConf.1.1
		3	TDDConf.2.1	TDDConf.2.1
PDSCH RMC		1	SR.1.1 FDD	N/A
configuration		2	SR.1.1 TDD	
		3	SR.2.1 TDD	
RMSI CORESET		1	CR.1.1 FDD	N/A
RMC		2	CR.1.1 TDD	N/A
configuration		3	CR.2.1 TDD	N/A
Dedicated		1	CCR.1.1 FDD	N/A
CORESET RMC		2	CCR.1.1 TDD	N/A
configuration		3	CCR.2.1 TDD	N/A
OCNG Patterns		1, 2, 3	OP.1	OP.1
TRS		1	TRS.1.1 FDD	N/A
Configuration		2	TRS.1.1 TDD	N/A
		3	TRS.1.2 TDD	N/A
IInitial BWP		1, 2, 3	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2, 3	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2, 3	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2, 3	SSB	SSB

M. Norso	dBm/SCS	1			·98		
$N_{oc}$ Note 2	u2, 000	2			·98		
		3		-95			
3.7	dBm/15 kHz	1			·98		
$N_{oc}$ Note 2	UDIII/ 13 KI IZ	2	-	-	.90		
		2	_				
		3					
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
L <sub>s</sub> /L <sub>ot</sub>		2					
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
$L_s/I_{oc}$		2					
		3					
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	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.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<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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

C	onfiguration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations.			

Table A.6.6.1.2.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Parameter Unit Test Value configur		Va	lue	Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
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.7	
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	·	Synchronous cells
		3	3 μs		Synchronous cells
T1	s	1, 2, 3	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		Cell 2	
		configuration	T1	T2	T1	T2
TDD configuration		1	TN	I/A	TN	I/A
		2	TDDConf.1.1		TDDConf.1.1	
		3	TDDC	TDDConf.2.1		onf.2.1
PDSCH RMC		1 SR.1.1 FDD		N	/A	
configuration		2	SR.1.	SR.1.1 TDD		
		3 SR.2.1 TDD		1		
	_	1 CR.1.1 FDD		N/A		
		2	CR.1.	1 TDD	N	/A

RMSI CORESET RMC configuration		3	CR.2.	CR.2.1 TDD N/A			
Dedicated		1	CCR.1	.1 FDD	N/	/A	
CORESET RMC		2		R.1.1 TDD N/A			
configuration		3		R.2.1 TDD N/A			
OCNG Patterns		1, 2, 3	OP.1 OP.1				
TRS configuration		1		.1 FDD	N/		
a constant		2		.1 TDD		/A	
		3		.2 TDD	N/		
Ilnitial BWP		1, 2, 3		VP.0.1	DLBW		
configuration		., _, =		VP.0.1	ULBW		
Active DL BWP		1, 2, 3		VP.1.1	DLBW		
configuration		, ,					
Active UL BWP		1, 2, 3	ULBV	ULBWP.1.1 ULBWP.1.1			
configuration							
RLM-RS		1, 2, 3	SS	SSB SSB			
Note 2	dBm/SCS	1	-98				
1 voc		2	-98				
		3		-	95		
M Note 2	dBm/15 kHz	1			98		
$N_{oc}$ Note 2		2					
		3					
î /ı	dB	1	4	-1.46	-Infinity	-1.46	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		2			,		
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
$E_s/N_{oc}$		2			,		
		3					
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25	
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16	
Propagation Condition		1, 2, 3	AWGN				

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.6.6.1.2.3 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<sub>DCCH</sub> 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

C	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:	e: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
		2	CSI-RS.1.2 TDD resource #0	
		3	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used

DRX	ms	1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test	Ce	II 1	Cell 2		
		configuration	T1	T2	T1	T2	
TDD		1		I/A	TN		
configuration		2		onf.1.1	TDDC		
		3		TDDConf.2.1		onf.2.1	
PDSCH RMC		1		1 FDD	N,	/A	
configuration		2		1 TDD			
		3	SR.2.	1 TDD			
RMSI CORESET		1	CR.1.1 FDD		N,	/A	
RMC		2	CR.1.	1 TDD	N,	/A	
configuration		3	CR.2.	1 TDD	N.	/A	
Dedicated		1	CCR.1	.1 FDD	N,	/A	
CORESET RMC		2		.1 TDD	N.	/A	
configuration		3		.1 TDD	N	/A	
OCNG Patterns		1, 2, 3		P.1	OF		
TRS		1, 2, 0		.1 FDD	N,		
configuration		2		.1 TDD		/A	
<b>3</b>		3	TRS.1.2 TDD		N,	/A	
Ilnitial BWP		1, 2, 3	DLBWP.0.1		DLBWP.0.1		
configuration			ULBV	VP.0.1	ULBWP.0.1		
Active DL BWP		1, 2, 3	DLBWP.1.2 DLBWP.1			/P.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBWP.1.2 ULBWP.1.1			/P.1.1	
configuration					SSB		
RLM-RS	ID /000	1, 2, 3	,			SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1			·98		
		2			.98		
		3			-95		
$N_{_{oc}}$ Note 2	dBm/15 kHz	1		-	.98		
		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
		2					
		3					
$\hat{E}_s/N_{oc}$	dB	1	4	4	-Infinity	4	
		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	
Propagat Condition			1, 2, 3	AWGN				
Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period T2.							
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{ac}$ to be fulfilled.							
Note 3:		6-RSRP levels have been derived from other parameters for information purposes. They are						

## A.6.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

## A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

### A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

Co	onfiguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	guired 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 ation	Value Test 1 Test 2		Comment		
			Test 1	Test 2			
Active cell		1, 2, 3	C	ell 1			
Neighbour cell		1, 2, 3	C	ell 2	Cell to be identified.		
RF Channel Number		1, 2, 3		and Cell 2			
Measurement gap type		1, 2, 3	Per-L	IE 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		.1 FR1			
		2	SSB.1 FR1				
		3	SSB.2 FR1				
SMTC configuration		1	SMTC.2				
		2	SMTC.1				
		3		TC.1			
CSI-RS parameters		1		DD resource #0			
		2		DD resource #0			
		3		DD resource #0			
A3-Offset	dB	1, 2, 3		4.5			
CP length		1, 2, 3	No	rmal			
Hysteresis	dB	1, 2, 3		0			
Time To Trigger	S	1, 2, 3		0	10.6%		
Filter coefficient		1, 2, 3	55)//	0	L3 filtering is not used		
DRX		1, 2, 3	DRX.1	DRX.7			
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.		
		2	3 us		3 us		Synchronous cells
		3			3 µs		Synchronous cells
T1	S	1, 2, 3		5	-		
T2	S	1, 2, 3	5	10			

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test	Ce	Cell 1		II 2
		configuration	T1	T2	T1	T2
TDD		1	TN/A TDDConf.1.1		TN/A	
configuration		2			TDDC	onf.1.1
		3	TDDC	TDDConf.2.1		onf.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	N	/A
RMC		2	CR.1.	CR.1.1 TDD		/A
configuration		3	CR.2.	CR.2.1 TDD		/A
Dedicated		1	CCR.1	CCR.1.2 FDD		/A
CORESET RMC		2	CCR.1	CCR.1.2 TDD		/A
configuration		3	CCR.2	CCR.2.1 TDD		/A
OCNG Patterns		1, 2, 3	0	P.1	Ol	P.1

N/A N/A N/A LBWP.0.1 LBWP.1.1				
N/A LBWP.0.1 LBWP.0.1 LBWP.1.1				
LBWP.0.1 LBWP.0.1 LBWP.1.1				
LBWP.0.1 LBWP.1.1				
LBWP.1.1				
LBWP.1.1				
SSB				
CSI-RS SSB -98				
8				
ity -1.46				
ity 4				
ity -94				
ity -94				
ity -91				
60 -62.25				
60 -62.25				
50 -56.16				
-58.50   -56.16  58.50   -56.16 AWGN				
i				

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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

#### A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

#### A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	s	1	5	
T2	S	1	5	

Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test			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		N,	N/A	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	N,	/A	
CORESET RMC							
configuration							
OCNG Patterns		1		P.1	OF		
TRS configuration		1		.1 FDD		/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			/P.1.1	
configuration							
Active UL BWP		1	ULBWP.1.1 ULBWP.1.1			/P.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 -94 -Infinity		-94	
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
Propagation		1	AWGN				
Condition							

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.6.6.1.5.3 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<sub>DCCH</sub> 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 resource #0	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	S	1	5	

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test			Cell 2		
		configuration			T1	T2	
TDD configuration		1	N/A		N/A		
PDSCH RMC configuration		1	SR.1.1 FDD		N/A		
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N/A		

Dedicated		1	CCR.1	.2 FDD	N,	/A	
CORESET RMC							
configuration							
OCNG Patterns		1	OF	P.1	OP.1		
TRS configuration		1	TRS.1	.1 FDD	N.	/A	
IInitial BWP		1	DLBV	VP.0.1	DLBW	DLBWP.0.1	
configuration			ULBV	VP.0.1	ULBW	ULBWP.0.1	
Active DL BWP		1	DLBV	VP.1.2	DLBW	/P.1.1	
configuration		·	DEST		DEDWI		
Active UL BWP		1	UI BV	ULBWP.1.2		ULBWP.1.1	
configuration		·	025***		025.77.11.1		
RLM-RS		1	CSI	CSI-RS		SSB	
$N_{oc}$ Note 2	dBm/SCS	1	-98				
1 voc							
$N_{oc}^{}$ Note 2	dBm/15 kHz	1	-98				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	4 -1.46		-1.46	
$\hat{E}_s/N_{oc}$	dB	1	4 4		-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94 -94		-Infinity	-94	
lo	dBm/9.36 MHz	1	-64.60 -62.2564.60 -6		-62.25		
Propagation		1	AWGN				
Condition							

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{ac}$  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<sub>DCCH</sub> 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 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell

Table A.6.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment				
		configurati on	Test 1	Test 2					
NR RF Channel Number		Config 1,2,3	1, 2		1, 2		1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.				
Neighbour cell		Config 1,2,3	NR 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	9	9					
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		Config 1	3ms		Asynchronous cells.				
serving and neighbour					The timing of Cell 2 is 3ms later				
cells					than the timing of Cell 1.				
		Config 2,3	3μs		Synchronous cells.				
T1	S	Config 1,2,3	5						
T2	S	Config 1,2,3	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		Cell 1 Cell 2	
		configuratio	T1 T2		T1	T2
		n				

NR RF Char	nnel Number		Config 1,2,3	1	2
			<b>5</b>	•	
Duplex mod	e		Config 1		FDD FDD
TDD configu	ration		Config 2,3 Config 1		pplicable
TDD conligu	iration				pplicable Conf.1.1
			Config 2		Conf.2.1
BW <sub>channel</sub>		N/ILI-	Config 3		
DVVchannel		MHz	Config 1,2 Config 3	10: N	I <sub>RB,c</sub> = 52 <sub>RB,c</sub> = 106
BWP BW		MHz	Config 1,2		
DVVP DVV		IVITZ	Config 1,2	10. N	I <sub>RB,c</sub> = 52 <sub>RB,c</sub> = 106
BWP	Initial DL BWP		Coning 3	DLBWP.0.1	RB,c = 100 NA
configurati	Initial UL BWP			ULBWP.0.1	NA NA
on	Dedicated DL		Config 1 2	DLBWP.1.1	NA NA
OII	BWP		Config 1, 2, 3	DLBWP.1.1	INA
	Dedicated UL BWP			ULBWP.1.1	NA
TRS configu	ıration		Config 1	TRS.1.1 FDD	NA
				TDC 4.4 TDD	N.A
			Config 2	TRS.1.1 TDD	NA
			Config 3	TRS.1.2 TDD	NA
OCNG Patte A.3.2.1.1 (O	erns defined in P.1)		Config 1,2,3	OP.1	OP.1
PDSCH Ref			Config 1	SR.1.1 FDD	-
measureme	nt channel		Config 2	SR.1.1 TDD	
			Config 3	SR.2.1 TDD	
RMSI CORE	SET Reference		Config 1	CR.1.1 FDD	
Channel	2021 ((0)0)0)00		Config 2	CR.1.1 TDD	
Criarino			Config 3	CR.2.1 TDD	
Dedicated C			Config 1	CCR.1.1 FDD	
Troicicióc C	Tidillioi		Config 2	CCR.1.1 TDD	
			Config 3	CCR.2.1 TDD	
SSB parame	eters		Config 1	SSB.1 FR1	SSB.5 FR1
COD parame	5.0.0		Config 2	SSB.1 FR1	SSB.5 FR1
			Config 3	SSB.2 FR1	SSB.6 FR1
SMTC confid	guration defined		Config 1	SMTC.2	SMTC.5
in A.3.11	garation domina		Config 2, 3	SMTC.1	SMTC.4
	CCH subcarrier	kHz	Config 1,2	OM TOTAL	15
spacing		<b>_</b>	Config 3		30
	of PSS to SSS				
EPRE ratio of to SSS	of PBCH DMRS				
EPRE ratio	of PBCH to PBCH				
DMRS EPRE ratio of PDCCH DMRS			1		
to SSS EPRE ratio of PDCCH to					
PDCCH DMRS EPRE ratio of PDSCH DMRS			Config 1,2,3	0	0
to SSS EPRE ratio of PDSCH to PDSCH					
		<del></del>			
EPRE ratio of OCNG DMRS			=		
to SSS(Note			1		
OCNG DMR					

Note2	dBm/15 kHz		-9	8		-98
Note2	dBm/S	Config 1,2	-6	8		-98
	CS	Config 3	-0	)5		-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	4	4	-Infinity	7
		1,2,3,4,5,6				
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io <sup>Note3</sup>	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	AW	GN	A۱	VGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N_{-\infty}}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

#### A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 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 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations				
Note 2:	target NR cell ha	target NR cell has the same SCS, BW and duplex mode as NR serving cell			

Table A.6.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1,2,3		1,	, 2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel
							number 1.
Najabbauraall	1	Config 1 2 2	NR ce	IIO			NR cell 2 is on NR RF channel
Neighbour cell		Config 1,2,3	INR CE	IIZ			number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Gap Fattern id		Coming 1,2,3	0		-		As specified in clause 9.1.2-1.
Measurement gap		Config 1,2,3	39		9		
offset		001111g 1,2,0					
A3-Offset	dB	Config 1,2,3	-6		I		
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.7	.1	.7	
Time offset between		Config 1	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 2 is 3ms later
cells							than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	1.1	11	1.1	11	
14	3	Corning 1,2,3	1.1	1 1 1	1.1		

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	Cell 1	Cell 2

			Test configuratio	T1	T2	T1	T2	
			n					
NR RF Channel Number			Config 1,2,3		1		2	
Duplex mode			Config 1		F	DD		
			Config 2,3			ΓDD		
TDD configur	ation		Config 1			pplicable		
			Config 2			Conf.1.1		
DW		NAL I—	Config 3			Conf.2.1		
BW <sub>channel</sub>		MHz	Config 1,2 Config 3			I <sub>RB,c</sub> = 52 <sub>RB,c</sub> = 106		
BWP BW		MHz	Config 1,2		40. N	$R_{B,c} = 100$ $R_{B,c} = 52$		
DVVI DVV		IVII IZ	Config 3			RB,c = 32		
BWP	Initial DL BWP		Config 1, 2,	DLBV	VP.0.1	KB,C = 100	NA	
configuratio			3 , ,					
n	Initial UL BWP		Config 1, 2,	ULBV	√P.0.1		NA	
			3					
	Dedicated DL BWP			DLBV	VP.1.1		NA	
	Dedicated UL BWP			ULBV	/P.1.1		NA	
TRS configura			Config 1	TRS.1	.1 FDD		NA	
				TD0.4			N1 A	
			Config 2	185.1	TRS.1.1 TDD		NA	
			Config 3	TRS.1.2 TDD		NA		
OCNG Patter A.3.2.1.1 (OP			Config 1,2,3	OP.1		(	OP.1	
PDSCH Refe	rence		Config 1	SR.1.	1 FDD		-	
measuremen	t channel		Config 2	SR.1.1 TDD		]		
			Config 3	SR.2.1 TDD				
RMSI CORES	SET Reference		Config 1	CR.1.1 FDD			-	
Channel			Config 2	CR.1.1 TDD				
			Config 3	CR.2.	1 TDD			
Dedicated CC Reference Ch	-		Config 1	CCR.1.1 FDD			-	
			Config 2	CCR.1	.1 TDD			
			Config 3		.1 TDD			
SSB paramet	ers		Config 1		1 FR1		3.5 FR1	
			Config 2		1 FR1		3.5 FR1	
CMTC andia			Config 3		2 FR1		3.6 FR1	
in A.3.11	uration defined		Config 1 Config 2, 3		ГС.2 ГС.1		MTC.5 MTC.4	
	CH subcarrier	kHz	Config 1,2	SIVI	10.1	15	vi i O. <del>4</del>	
spacing			Config 3		30			
EPRE ratio of	PSS to SSS		229					
EPRE ratio of PBCH DMRS to SSS			-					
EPRE ratio of PBCH to PBCH			-					
DMRS EPRE ratio of PDCCH DMRS			Config 1,2,3	(	0		0	
to SSS	LDCCU DIVIKS		209 1,2,0	·	-		-	
EPRE ratio of			1					
PDCCH DMR			<u> </u>					
EPRE ratio of to SSS	PDSCH DMRS							

	1					
EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2	dBm/15	Config 1,2,3	-0	98	-	-98
oc	kHz	_				
Note2	dBm/S	Config 1,2	-6	98		-98
	CS	Config 3	-95		-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config	4	4	-Infinity	7
$\mathbf{L}_{\mathrm{s}}^{\prime}/\mathbf{I}_{\mathrm{ot}}$		1,2,3,4,5,6				
$\hat{E_s}/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
L						
Io <sup>Note3</sup>	dBm/9.	Config 1,2	-64.59	-64.59	-70.05	-62.2
	36MHz					
	dBm/38	Config 3	-58.49	-58.49	-63.94	-56.15
	.16MHz					
Propagation Condition		Config 1,2,3	AWGN		AWGN	
Nata 4. OCNIC aball bassass	Larrala (la a Cla	. d II				'11 I

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N_{-\infty}}$  to be 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
rieid	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-UE 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-FR 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

#### A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

Config		Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell 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	Value	Comment
----------------	-------	---------

		Test	Test 1	Test 2	
		configurati on			
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	9	9	
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

Parameter		Unit	Test	Ce	ell 1	C	cell 2
			configuratio	T1	T2	T1	T2
			n				
NR RF Chan	nel Number		Config 1,2,3	,	1		2
Duplex mode			Config 1		F	DD	
			Config 2,3		Т	DD	
TDD configur	ation		Config 1			oplicable	
			Config 2		TDDC	Conf.1.1	
			Config 3		TDDC	Conf.2.1	
BW <sub>channel</sub>		MHz	Config 1,2		10: N <sub>i</sub>	$_{RB,c} = 52$	
			Config 3		40: N <sub>R</sub>	B,c = 106	
BWP BW		MHz	Config 1,2		10: Ni	RB,c = 52	
			Config 3		40: N <sub>R</sub>	B,c = 106	
BWP	Initial DL BWP		]	DLBV	VP.0.1		NA
configuratio	Initial UL BWP			ULBV	VP.0.1	NA	
n	Dedicated DL BWP		Config 1, 2, 3	DLBV	VP.1.1		NA
	Dedicated UL BWP			ULBV	VP.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 Patter	ns defined in		Config 1,2,3	OI	P.1		)P.1
A.3.2.1.1 (OF	P.1)						
PDSCH Refe			Config 1	SR.1.	1 FDD		-
measuremen	measurement channel		Config 2	SR.1.	1 TDD		
			Config 3	SR.2.	1 TDD	1	
			Config 1	CR.1.	1 FDD		-

RMSI CORESET Reference		Config 2	CR 1	1 TDD		
Channel		Config 3		1 TDD		
Dedicated CORESET						
Reference Channel		Config 1	CCR.1	.1 FDD		-
		Config 2		.1 TDD		
		Config 3		.1 TDD		
SSB parameters		Config 1	SSB.	1 FR1	SSE	3.5 FR1
		Config 2		1 FR1		3.5 FR1
		Config 3		2 FR1		3.6 FR1
SMTC configuration defined		Config 1		TC.2		MTC.5
in A.3.11		Config 2, 3	SM	TC.1		/ITC.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		0		2		0
PDCCH DMRS		Config 1,2,3	1	0		0
EPRE ratio of PDSCH DMRS						
to SSS						
EPRE ratio of PDSCH to	ļ					
PDSCH EPRE ratio of OCNG DMRS	<del>                                     </del>					
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2	dBm/15		-9	98		-98
N oc	kHz		`			
Note2	dBm/S	Config 1,2	-9	98		-98
IV 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
Ê,/I,	dB	Config 1,2,3	4	4	-Infinity	7
$\hat{E}_{s}/N_{oc}$	dB	Config 1,2,3	4	4	-Infinity	7
Io <sup>Note3</sup>	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	/GN	A۱	WGN
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: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N_{-\infty}}$  to be 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 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 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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 with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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:	lote 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	target NR cell ha	as the same SCS, BW and duplex mode as NR serving cell			

Table A.6.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3	1, 2			Two FR1 NR carrier frequencies is used.	

Active cell		Config 1,2,3	NR 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		4	As specified in clause 9.1.2-1.	
Measurement gap offset		Config 1,2,3	39 9		9		
A3-Offset	dB	Config 1,2,3		-	6		
Hysteresis	dB	Config 1,2,3		(	)		
CP length		Config 1,2,3		Nor	mal		
TimeToTrigger	S	Config 1,2,3		(	)		
Filter coefficient		Config 1,2,3		(	)		L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3 ms		•	Asynchronous cells. The timing of Cell 2 is 3ms later 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

Pa	rameter	Unit	Test	Се	II 1	C	ell 2
			configuratio	T1	T1 T2		T2
			n				
NR RF Char	nnel Number		Config 1,2,3		1		2
Duplex mode	Э		Config 1			FDD	
			Config 2,3			TDD	
TDD configu	ration		Config 1			Applicable	
			Config 2		TDD	Conf.1.1	
			Config 3		TDD	Conf.2.1	
BW <sub>channel</sub>		MHz	Config 1,2			$N_{RB,c} = 52$	
			Config 3			RB,c = 106	
BWP BW		MHz	Config 1,2		10: N	$N_{RB,c} = 52$	
			Config 3		40: N	RB,c = 106	
BWP	Initial DL BWP			DLBV	VP.0.1		NA
configurati	Initial UL BWP			ULBV	ULBWP.0.1		NA
on	Dedicated DL BWP		Config 1, 2, 3	DLBV	DLBWP.1.1		NA
	Dedicated UL BWP			ULBV	VP.1.1		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 A.3.2.1.1 (O	erns defined in P.1)		Config 1,2,3	OI	⊃.1		DP.1
PDSCH Refe			Config 1	SR.1.	1 FDD		-
measuremer	nt channel		Config 2	SR.1.	1 TDD		
			Config 3	SR2.	1 TDD		
RMSI CORE	SET Reference		Config 1	CR.1.	1 FDD		-
Channel	Channel		Config 2	CR.1.	1 TDD		
			Config 3	CR2.	1 TDD	1	
Dedicated C Reference C	-		Config 1	CCR.1	.1 FDD		-

		Config 2	CCR.1	.1 TDD	1	
		Config 3	CCR.2	.1 TDD	1	
SSB parameters		Config 1	SSB.	1 FR1		3.5 FR1
-		Config 2	SSB.	1 FR1	SSE	3.5 FR1
		Config 3	SSB.2	2 FR1	SSE	3.6 FR1
SMTC configuration defined		Config 1	SM	ΓC.2	SN	/ITC.5
in A.3.11		Config 2, 3	SM	ΓC.1	SN	/ITC.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		Config 1,2,3	,	)		0
PDCCH DMRS		Corning 1,2,3	,	J		U
EPRE ratio of PDSCH DMRS						
to SSS EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2	dBm/15 kHz		-6	98		-98
Note2	dBm/S	Config 1,2	_ç	98		-98
N 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 <sup>Note3</sup>	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	WGN
Note 1: OCNG shall be used	such that h				nt total trans	mitted 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  $_{N}$   $_{\infty}$  to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

# A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160ms 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 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 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 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

#### A.6.6.3 Inter-RAT Measurements

# A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

#### A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		1	1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables	
		A.6.6.3.1.1-2 and	
		A.6.6.3.1.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-
			UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP	Measurement quantity for Cell 2
measurement quantity			
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97	E-UTRAN RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
Hysteresis	dB	0	
TimeToTrigger	S	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	OFF
T1	S	5	
T2	S	5	
Note 1: Values are defined	l in Table A.	6.6.3.1.1-3	•

Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1		
			_	T1	T2	
RF channel number			1, 2, 3, 4, 5, 6		1	
Duplex mode			1, 2, 3		FDD	
·			4, 5, 6		TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDD	Conf.1.1	
_	SCS=30 KHz		3, 6	TDD	Conf.2.1	
BW <sub>channel</sub>		MHz	1, 4	10: N <sub>RB</sub> ,	c = 52 (FDD)	
			2, 5	10: N <sub>RB</sub> ,	c = 52 (TDD)	
			3, 6	40: N <sub>RB,c</sub>	= 106 (TDD)	
PDSCH reference n	neasurement		1, 4	SR.	1.1 FDD	
channel			2, 5	SR.	1.1 TDD	
			3, 6	SR.:	2.1 TDD	
RMSI CORSET refe	rence channel		1, 4	CR.	1.1 FDD	
			2, 5	CR.	1.1 TDD	
			3, 6	CR.	2.1 TDD	
Dedicated CORSET	reference channel		1, 4	CCR	.1.1 FDD	
			2, 5	CCR	.1.1 TDD	
			3, 6	CCR	.2.1 TDD	
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLE	3WP.0.1	
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLE	3WP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULE	3WP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULE	3WP.1.1	
OCNG pattern <sup>Note1</sup>			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	

CSI-RS for tracking		1, 4	TDC	1.1 FDD
CSI-RS for tracking		· · · · · · · · · · · · · · · · · · ·		
		2, 5		1.1 TDD
10 T		3, 6		1.2 TDD
b2-Threshold1	dBm	1, 2, 4, 5		-96
5005 # 1 1000 # 000		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 <sub>oc</sub> Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
N <sub>oc</sub> Note2	dBm/SCS	1, 2, 4, 5	<u> </u>	104
		3, 6		101
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	16	0
Ê <sub>s</sub> /I <sub>ot</sub> Note3	dB	1, 2, 3, 4, 5, 6	16	0
SS-RSRP <sup>Note3</sup>	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
SSB_RP <sup>Note3</sup>	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	A'	WGN
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		1x2
Matrix				
Note 1: OCNG shall be used such that	t both cells are fu	lly allocated and a c	onstant total tra	ansmitted 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 to be

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.1.1-4: 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 configuration <sup>Note1</sup>		4, 5, 6	6			
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6	1			
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub>	= 25		
			10 MHz: N <sub>RB</sub> ,	c = 50		
			20 MHz: N <sub>RB,c</sub>	= 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.7	FDD		
DL Reference Measurement			10 MHz: R.3	10 MHz: R.3 FDD		
Channel <sup>Note2</sup>			20 MHz: R.6	FDD		

		4.5.0	EMIL. D.	TDD
		4, 5, 6	5 MHz: R.4	
			10 MHz: R.0 TDD	
			20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.1	
parameters:			10 MHz: R.	
DL Reference Measurement			20 MHz: R.1	
Channel <sup>Note2</sup>		4, 5, 6	5 MHz: R.1	
			10 MHz: R.	-
			20 MHz: R.1	0 TDD
OCNG Patterns <sup>Note2</sup>		1, 2, 3	5 MHz: OP.2	
			10 MHz: OP.	10 FDD
			20 MHz: OP.	
		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 <sup>Note3</sup>				
OCNG RB <sup>Note3</sup>				
Noc <sup>Note4</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-106	
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	19
Ês/Iot <sup>Note5</sup>	dB	1, 2, 3, 4, 5, 6	-Infinity	19
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
SCH RP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-73.21+10log (N <sub>RB,c</sub> /50)	-56.12+10log (N <sub>RB,c</sub> /50)
Propagation Condition		1, 2, 3, 4, 5, 6	AWGI	, N
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2	
Correlation Matrix				
N 4 4 0 11 16 1		f: (:	''' 1' 4 11 40 4' TO	00.044.5001

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 lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

#### A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1 Test 2		Comment		
		Value				
NR RF Channel Number		1		1 NR carrier frequency is used in the test		
LTE RF Channel Number		2	2 1 LTE carrier frequency is used in the			
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.2.1-2 and A.6.6.3.2.1-3.				
Active cell		Cell 1		Cell 1 is on RF channel number 1		
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2		
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE gap pattern.		
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1		
Inter-RAT E-UTRAN measurement quantity		RSRP		Measurement quantity for Cell 2		
b2-Threshold1	dBm	Note 1		Note 1		SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97		-97		E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2

Hysteresis	dB	0		
TimeToTrigger	S	0		
Filter coefficient		0		L3 filtering is not used
DRX		DRX.1	DRX.7	DRX cycle configurations DRX.1 and DRX.7 are defined in Table A.3.3.1-1 and Table A.3.3.7-1 respectively.
T1	S	5		
T2	S	5	15	
Note 1: Values are defined in Table A.6.6.3.2.1-3				

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Para	meter	Unit	Configuration	Cell 1
				T1 T2
	RF channel number		1, 2, 3, 4, 5, 6	1
Duplex mode			1, 2, 3	FDD
			4, 5, 6	TDD
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1
	SCS=30 KHz		3, 6	TDDConf.2.1
BW <sub>channel</sub>		MHz	1, 4	10: N <sub>RB,c</sub> = 52 (FDD)
			2, 5	10: N <sub>RB,c</sub> = 52 (TDD)
			3, 6	40: N <sub>RB,c</sub> = 106 (TDD)
PDSCH reference i	measurement		1, 4	SR.1.1 FDD
channel			2, 5	SR.1.1 TDD
			3, 6	SR.2.1 TDD
RMSI CORSET ref	erence channel		1, 4	CR.1.1 FDD
			2, 5	CR.1.1 TDD
			3, 6	CR.2.1 TDD
Dedicated CORSE	T reference channel		1, 4	CCR.1.1 FDD
			2, 5	CCR.1.1 TDD
			3, 6	CCR.2.1 TDD
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1
OCNG pattern <sup>Note1</sup>			1, 2, 3, 4, 5, 6	OP.1
SMTC configuration			1, 2, 3, 4, 5, 6	SMTC.1
SSB configuration			1, 2, 4, 5	SSB.1 FR1
			3, 6	SSB.2 FR1
CSI-RS for tracking	l		1, 4	TRS.1.1 FDD
			2, 5	TRS.1.1 TDD
			3, 6	TRS.1.2 TDD
b2-Threshold1		dBm	1, 2, 4, 5	-96
		GDIII	3, 6	-93
EPRE ratio of PSS				
EPRE ratio of PBC				
EPRE ratio of PBC				
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 <sub>oc</sub> Note2	IG TO OCING DIVIRS	-ID /4 C IZI !-	400450	404
N <sub>oc</sub> Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6	-104
Noc. Total		dBm/SCS	1, 2, 4, 5	-104

		3, 6		-101
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	16	0
Ê <sub>s</sub> /I <sub>ot</sub> Note3	dB	1, 2, 3, 4, 5, 6	16	0
SS-RSRP <sup>Note3</sup>	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
SSB_RP <sup>Note3</sup>	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
IoNote3	dBm/9.36 MHz	1, 2, 4, 5	-59.94	-73.04
10.1616	dBm/38.16 MHz	3, 6	-53.84	-66.93
Propagation condition		1, 2, 3, 4, 5, 6	Α	WGN
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 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
- Note 3: Ê<sub>s</sub>/I<sub>ot</sub>, 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 <sup>Note1</sup>		4, 5, 6	6
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6	1
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub> = 25 10 MHz: N <sub>RB,c</sub> = 50 20 MHz: N <sub>RB,c</sub> = 100
PDSCH parameters: DL Reference Measurement Channel <sup>Note2</sup>		1, 2, 3	5 MHz: R.7 FDD 10 MHz: R.3 FDD 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 parameters: DL Reference Measurement		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD
Channel <sup>Note2</sup>		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD
OCNG Patterns <sup>Note2</sup>		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 PBCH_RB PSS_RA	dB	1, 2, 3, 4, 5, 6	0

SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB				
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA <sup>Note3</sup>				
OCNG RB <sup>Note3</sup>				
N <sub>oc</sub> Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	-Infinity	17
Ê <sub>s</sub> /I <sub>ot</sub> Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	17
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
SCH_RP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-73.21+10log (N <sub>RB,c</sub> /50)	-56.12+10log (N <sub>RB,c</sub>
.0				/50)
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		
Correlation Matrix Note6				
	P 1 1 P 1	e: .:	''' 1: 4 11 404: TO	00 044 5003

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 5:  $\hat{E}_s/I_{ot}$ , RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

#### A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.6.6.4 L1-RSRP measurement for beam reporting

#### A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

### A.6.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.1.1-1.

Table A.6.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested		equired to be tested in one of the supported test configurations

# A.6.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.1.2-1 and Table A.6.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N <sub>RB,c</sub> = 52
BWchannel	2	MHz	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chamie	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD
Charine	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Gharmer	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
Titida BVVI Coringaration	11-0		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
-			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		Off
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2

L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	. 0	ub.	Ŭ
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~3		AWGN

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.6.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0 SSB#1		3#1	
Parameter	Config	Onit	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~3	dBm/15kHz		-94	.65	
$N_{oc}^{ m Note2}$	1,2	dBm/SSB SCS	-94.65 -91.65 0 0 -Infinity 3 -94.65 -94.65 -Infinity -91.65			
TV <sub>oc</sub>	3	dbiii/33b 303	-91.65			
$\hat{\mathrm{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
COD INDIA	3	abilitioob ooo	-91.65	-91.65	-Infinity	-88.65
lo Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.6.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

#### A.6.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.2.1-1.

Table A.6.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description			
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	nly required to be tested in one of the supported test configurations			

#### A.6.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.2.2-1 and Table A.6.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N <sub>RB,c</sub> = 52
BWchannel	2	MHz	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chame	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD

	_	ı	
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Chamer	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial DMD Configuration	4.0		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
D. II. A. LEWE. C. C.	4.0		DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		DRX.3
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			·
EPRE ratio of PBCH DMRS to SSS	_		
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH	_		
DMRS			
EPRE ratio of PDSCH DMRS to	1~3	dB	0
SSS			
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
	4.0		AVA/CAL
Propagation condition	1~3		AWGN

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.6.6.4.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSE	3#1
Parameter	Config	Unit	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~3	dBm/15kHz -94.65				
<i>N</i> Note2 1,2		dD/CCD CCC	-94.65			
$N_{oc}^{ m Note2}$	3	dBm/SSB SCS -91.65		.65		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	0	-Infinity	3

SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
OOD NON	3	GBIT(700B 000	-91.65	-91.65	-Infinity	-88.65
lo Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### A.6.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

#### A.6.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.3.1-1.

Table A.6.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description		
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	s only required to be tested in one of the supported test configurations		

#### A.6.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.3.2-1 and Table A.6.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
332 333.1	1		FDD
Duplex mode	2	-	TDD
2 aprox mode	3	1	TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
122 Gorniguration	3		TDDConf.2.1
	1		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2	MHz	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106
DD00HD (	1		SR.1.1 FDD
PDSCH Reference measurement	2	1	SR.1.1 TDD
channel	3	1	SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2	1	CR.1.1 TDD
	3		CR.2.1 TDD
	1		CCR.1.1 FDD
Dedicated CORESET Reference	2		CCR.1.1 TDD
Channel	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2	-	SSB.3 FR1
garanen.	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
garaner:	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
gg	3		TRS.1.2 TDD
	_		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
B 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		Off
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
·			SSB#0 for resource#0
qcl-Info	1~3		SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	S	5
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH DMPS			
EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to SSS			

EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation condition	1~3		AWGN		
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and					

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.6.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
$N_{oc}$ Note1	1~3	dBm/15kHz	-94	.65
$N_{oc}^{ m Note1}$	1,2	dBm/SSB SCS	-94	.65
TV <sub>oc</sub>	3	UBIII/33B 3C3	-91	.65
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	3
CSI-RS RSRP	-RS RSRP 1,2 dBm/SSB SCS		-94.65	-91.65
Note2	3	dbiii/33b 303	-91.65	-88.65
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93
10	3 dBm/38.16 MHz		-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.6.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

#### A.6.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.4.1-1.

Table A.6.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description		
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	The UE is only required to be tested in one of the supported test configurations			

#### A.6.6.4.4.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.4.2-1 and Table A.6.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2	MHz	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chamer	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Charine	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1

	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial DMD Configuration	4.0		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
Dedicated DMD configuration	4.0		DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
and Info	1~3		SSB#0 for resource#0
qcl-Info	1~3		SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSS <sup>Note 1</sup>			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN

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.6.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1			
Note1	1~3	dBm/15kHz	-94.65				
Note1	1,2	- dBm/SSB SCS	-94.65				
TV <sub>oc</sub> Note 1	3	UDIII/33B 3C3	-91.65				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	3			
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65			
Note2	3	GBIII/33B 3C3	-91.65	-88.65			
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93			

	3	dBm/38.16 MHz	-57.59	-55.84
$\hat{E}_s/N_{oc}$	1~3	dB	0	3

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: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.6.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.6.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC\_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

### A.6.7.1 SS-RSRP

# A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

### A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

# A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parame	eter	Unit	Tes			Test 2		st 3
		Jill	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID SSB ARFCN		489 fre	0	489 fre	0	489 fre	0	
	Config 1		ile	iq i	FC		l lie	<u> </u>
Duplex mode	Config 2,3				TD			
	Config 1		Not Applicable					
TDD configuration	Config 2		TDDConf.1.1					
	Config 3				TDDC	onf.2.1		
	Config 1				10: N <sub>R</sub>	<sub>B,c</sub> = 52		
BW <sub>channel</sub>	Config 2	MHz			10: N <sub>R</sub>	3,c = 52		
	Config 3				40: N <sub>RB</sub>	,c = 106		
	Config 1				10: N <sub>R</sub>	s,c = 52		
BWP BW	Config 2				10: N <sub>R</sub>	s,c = 52		
	Config 3				40: N <sub>RB</sub>	,c = 106		
Downlink initial BWP cor	nfiguration				DLBW	/P.0.1		
Downlink dedicated BW	P configuration				DLBW	/P.1.1		
Uplink initial BWP config	juration			ULBWP.0.1				
Uplink dedicated BWP c	onfiguration				ULBW	/P.1.1		
TRS configuration	0-25-4		TRS.1.	NA	TRS.1	NA	TRS.1.	NA
	Config 1		1 FDD		.1 FDD		1 FDD	
			TRS.1.	NA	TRS.1	NA	TRS.1.	NA
	Config 2		1 TDD		.1 TDD		1 TDD	
			TRS.1.	NA	TRS.1	NA	TRS.1.	NA
	Config 3		2 TDD		.2		2 TDD	
DRX Cycle		ms			TDD Not App	olicable		
DRA Cycle		1115	OD 4.4			Jilcable	CD 4.4	
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference	Config 2		SR.1.1		SR.1.1		SR.1.1	
measurement channel	Config 2		TDD	_	TDD	-	TDD	-
	Config 3		SR2.1		SR2.1		SR2.1	
	3		TDD		TDD		TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET			CR.1.1		CR.1.1		CR.1.1	
Reference Channel	Config 2		TDD	-	TDD	-	TDD	-
	Config 2		CR2.1	1	CR2.1		CR2.1	
	Config 3		TDD		TDD		TDD	
	Config 1		CCR.1.		CCR.1.		CCR.1.	
Control channel RMC			1 FDD	_	1 FDD	-	1 FDD	-
	Config 2		CCR.1. 1 TDD		CCR.1. 1 TDD		CCR.1. 1 TDD	
			טטוי		טטוו		טטוו ו	

		Config 3		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
		Config 1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
SSB config	juration	Config 2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 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 1	Config 1	ms	-	3	-	3	-	3
Timo onoc	- With Con 1	Config 2,3	μs	-	3	-	3	-	3
SMTC con	figuration	Config 1				SMT			
		Config 2,3				SMT			
OCNG Pat	terns	Confin 4.0				OCNG p			
PDSCH/PI subcarrier		Config 1,2 Config 3	kHz			15 l 30k			
EPRE ration EPRE ration EPRE ration EPRE ration EPRE ration EPRE ration EPRE ration EPRE ration	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		dB	0	0	0	0	0	0
Note2	Config 1,2  Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C	dBm/15Kh Z	-10 Napplical	ot		38	-11 -11 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	14 3.5 13 2.5 12 11 0.5 14 3.5 13 2.5 12 11 0.5
Note2	Config 1,2	1417_1 DD_EK1_N	dBm/SCS	-10	06	-8	38	Sam	e as 5kHz
						·			

		NR_FDD_FR1_A, NR_TDD_FR1_A						-1	11
		NR_FDD_FR1_B						_11	0.5
		NR_TDD_FR1_C		N	ot				10
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		applica	ble <sup>Note 5</sup>	-6	91	-10	9.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_G							80
Ê/I		NR_FDD_FR1_H		0.40		0.40		-0.01	7.5 -4.76
$\hat{\mathbf{E}}/\mathbf{I}_{\text{ot}}$			dB	2.46	-5.97	2.46	-5.97		
$\hat{E}_{s}/N_{oc}$	T		dB	6	1	6	1	3	0
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						- 111.00	- 114.00
		NR_FDD_FR1_B				5 -82	-87	- 110.50	- 113.50
		NR_TDD_FR1_C						- 110.00	- 113.00
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-100	-105			- 109.50	- 112.50
SS- RSRP <sup>Not</sup>		NR_FDD_FR1_E, NR_TDD_FR1_E	dBm/SCS					109.00	- 112.00
		NR_FDD_FR1_G						- 108.00	- 111.00
		NR_FDD_FR1_H						- 107.50	- 110.50
e3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6		Not	Not		-90	108.00	- 111.00
		NR_FDD_FR1_B						- 107.50	- 110.50
		NR_TDD_FR1_C				ic Not -85		- 107.00	- 110.00
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		applica ble <sup>Note 5</sup>	applic able <sup>Not</sup> e 5			- 106.50	- 109.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						- 106.00	109.00
		NR_FDD_FR1_G						- 105.00	- 108.00
		NR_FDD_FR1_H						- 104.50	- 107.50
		NR_FDD_FR1_A, NR_TDD_FR1_A							.03
		NR_FDD_FR1_B						-70	.53
		NR_TDD_FR1_C							.03
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-70	.09	-52	2.09	-78	.53
Io <sup>Note3</sup>		NR_FDD_FR1_E,						-78	.03
		NR_TDD_FR1_E NR_FDD_FR1_G						-77	7.03
		NR_FDD_FR1_H							5.53
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	N applicat	ot ole <sup>Note 5</sup> -	-51	.99	-73	.94

	NR_FDD_FR1_B			-73.44
	NR_TDD_FR1_C			-72.94
	NR_FDD_FR1_D,			-72.44
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			-71.94
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			-70.94
	NR_FDD_FR1_H			-70.44
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  $N_{N_{\rm col}}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

#### A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

# A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

#### A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only red	quired to be tested in one of the supported test configurations in each supported band

# A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Config Unit		Test 1		Test 2	
	Coning	Ullit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
BWchannel	1	MHz	10: N <sub>RB c</sub> = 52		10: N <sub>RB</sub>	c = 52	

		2		10: N <sub>RB,c</sub>	= 52	10: N <sub>RB,0</sub>	= 52
		3		40: N <sub>RB,c</sub> = 106		40: N <sub>RB,c</sub>	
		1		FDD		FDD	
Duplex mod	Duplex mode		1	TDD		TDI	
			Ī	TDD	TDD		)
		3		N/A		N/A	\
TDD configu	uration	2	1	TDDCon	f.1.1	TDDCor	nf.1.1
3		3	1	TDDCon		TDDCor	
DD0011D		1		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Ref		2	j	SR.1.1 TDD	-	SR.1.1 TDD	-
measureme	ent channel	3	İ	SR.2.1 FDD		SR.2.1 FDD	
DMCI CODI	CCT Deference	1		CR.1.1 FDD	-	CR.1.1 FDD	-
Channel	ESET Reference	2	]	CR.1.1 TDD	-	CR.1.1 TDD	-
Criarine		3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated C	CODECET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference (		2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
Treference C	Jilaililei	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
		1		SSB.1 F	R1	SSB.1	FR1
SSB configu	uration	2	]	SSB.1 F		SSB.1	
		3		SSB.2 F		SSB.2	
OCNG Patte	erns	1~3		OP.1	1	OP.	1
		1		TRS.1.1 FDD		TRS.1.1 FDD	
TRS configu	uration	2		TRS.1.1 TDD	-	TRS.1.1 TDD	
		3		TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP	Initial BWP Configuration			DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated E	BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1		DLBWP.1.1 ULBWP.1.1	
		1	ms	-	3	-	3
Time offset	with Cell 1	2,3	μs	-	3	-	3
SMTC confi	auration.	1		SMTC	.2	SMTC.2	
		2,3		SMTC	.1	SMTC.1	
EPRE ratio of							
SSS	f PBCH DMRS to						
	f PBCH to PBCH						
DMRS	f DDCCLL DMDC +-	-					
SSS SSS	f PDCCH DMRS to						
	f PDCCH to PDCCH	1					
DMRS		1~3	dB	0	0	0	0
EPRE ratio of	f PDSCH DMRS to						
SSS	(DD0011: DE55::						
	f PDSCH to PDSCH						
DMRS EPRE ratio of OCNG DMRS to		-					
SSS <sup>Note 1</sup>							
EPRE ratio of OCNG to OCNG		1					
DMRS Note 1							
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5						-115
Notos	NR_FDD_FR1_B	-				N a	-114.5
$N_{oc}$ Note2	NR_TDD_FR1_C	1~3	dBm/15	-94.6	5	$(N_{oc})_{for}$	-114.5
	NR_FDD_FR1_D,	1~3	kHz			Channel 2	-113.5
	NR_TDD_FR1_D					+8dB)	-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113

	ND EDD ED4 O		I			I	110
	NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5
	NR_FDD_FR1_A,						-111.5
$N_{oc}$ Note2	NR_TDD_FR1_A	1,2	dBm/SS B SCS				110
	NOTE 5,						-114.5
	NR_FDD_FR1_B NR_TDD_FR1_C			-94.65		$(N_{oc} \text{ for } Channel 2 \\ +8dB)$	-114.5
	NR_FDD_FR1_D,						-113.5
	NR_TDD_FR1_D						
	NR_FDD_FR1_E, NR_TDD_FR1_E					+800)	-113
	NR_FDD_FR1_G						-112
	NR_FDD_FR1_H						-111.5
	NR_FDD_FR1_A,						-112.00
	NR_TDD_FR1_A						
	NR_FDD_FR1_B			-91.65		1	-111.50
	NR_TDD_FR1_C					$(N_{oc})_{for}$	-111.00
	NR_FDD_FR1_D,	3				Channel 2 +8dB)	-110.50
	NR_TDD_FR1_D NR_FDD_FR1_E,						-110.00
	NR_TDD_FR1_E						110.00
	NR_FDD_FR1_G						-109.00
	NR_FDD_FR1_H						-108.50
	$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	1~3	dB	10	10	13	-3
	NR_FDD_FR1_A,						
	NR_TDD_FR1_A	1,2,4,5					-118.00
	NR_FDD_FR1_B						-117.50
	NR_TDD_FR1_C					(RSRP for	-117.00
	NR_FDD_FR1_D, NR_TDD_FR1_D			-84.65		Cell 2 +25dB)	-116.50
	NR_FDD_FR1_E,						
	NR_TDD_FR1_E						-116.00
00	NR_FDD_FR1_G						-115.00
SS- RSRP <sup>Note3</sup>	NR_FDD_FR1_H NR_FDD_FR1_A,		dBm/SC				-114.50 -115.00
KOKF	NR_TDD_FR1_A		S				-113.00
	NOTE 5,			-81.65		(RSRP for Cell 2 +25dB)	44450
	NR_FDD_FR1_B NR_TDD_FR1_C						-114.50
	NR_FDD_FR1_D,						-114.00 -113.50
	NR_TDD_FR1_D						
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113.00
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
	NR_FDD_FR1_A,	1,2	dBm/ 9.36MH z			(Io for	-85.28
	NR_TDD_FR1_A						
Io <sup>Note3</sup>	NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C						-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D			-56.28	Channel 2	-83.78	
	NR_FDD_FR1_E,					+19.75dB)	-83.28
	NR_TDD_FR1_E						
	NR_FDD_FR1_G						-82.28
	NR_FDD_FR1_H NR_FDD_FR1_A,						-81.78 -79.19
	NR_TDD_FR1_A	3	dBm/ 38.16M Hz	-50.19			-13.13
	NOTE 5,					(Io for	70.00
	NR_FDD_FR1_B					Channel 2 +19.75dB)	-78.69 -78.19
	NR_TDD_FR1_C NR_FDD_FR1_D,						-78.19
	NR_TDD_FR1_D						11.00

NR_FDD_FR1_E,						-77.19
NR_TDD_FR1_E						
NR_FDD_FR1_G						-76.19
NR_FDD_FR1_H						-75.69
$\hat{E}_s/N_{oc}$	1~3	dB	10	10	13	-3
Propagation condition	1~3	-	AWGN		AWGN	
Antenna configuration	1~3		1x2		1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

#### A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

#### A.6.7.1.3 Void

# A.6.7.2 SS-RSRQ

# A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

# A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

#### A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only 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

Parameter		Unit	Test 1		Test 2		Test 3	
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1		freq1		freq1	
Duplex mode	Config 1		FDD					

	Config 2,3	1	1		TD	D		
	Config 1				Not App			
TDD configuration	Config 2	†			TDDCc			
	Config 3	†			TDDCc			
	Config 1				10: N <sub>RB</sub>			
BWchannel	Config 2	MHz			10: N <sub>RB</sub>			
DVVCnamer	Config 3	- 1711 12			40: N <sub>RB</sub> ,			
Gap Pattern ID	Corning 5				40. NRB,			
Gap rattern ib	Initial DL BWP				DLBW			
	Dedicated DL							
BWP configuration	BWP				DLBW	P.1.1		
BWT comigaration	Initial UL BWP				ULBW	P.0.1		
	Dedicated UL BWP				ULBW	P.1.1		
DRX Cycle		ms			Not App	licable		
	Config 4		SR.1.1	SR 1 1 SR 1 1 SR.1.				
	Config 1		FDD		FDD		1 FDD	
PDSCH Reference			SR.1.1		SR.1.1	1	SR.1.	
measurement channel	Config 2		TDD	-	TDD	-	1 TDD	-
			SR2.1		SR2.1	-	SR2.1	
	Config 3		TDD		TDD		TDD	
	0 " 1		CR.1.1		CR.1.1		CR.1.	
	Config 1		FDD		FDD		1 FDD	
RMSI CORESET		1	CR.1.1		CR.1.1	1	CR.1.	
Reference Channel	Config 2		TDD	-	TDD	-	1	
		+				-	TDD CR.2.	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		1	
							TDD CCR.	
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		1.1	
	-	_	1 1 1 1 1 1		1 1 1 1 1 1	1	FDD	
Control Channel RMC	Config 2		CCR.1.	_	CCR.1.	_	CCR. 1.1	_
			1 TDD		1 TDD		TDD	
	Config 3		CCR.2.		CCR.2.		CCR. 2.1	
	Coning 3		1 TDD		1 TDD		TDD	
	Config 1		TRS.1.1		TRS.1.1		TRS.1.	
	Coming 1	_	FDD		FDD	1	1 FDD	
TRS Configuration	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-
	Config 3	1	TRS.1.2		TRS.1.2 TDD	1	TRS.1. 2 TDD	
OCNG Patterns	OCNG Patterns			l	OP.	. 1		
SS-RSSI-Measurement					Not App			
Config 1		ms	_	3	-	3	_	3
Time offset with Cell 1	Config 2,3	μs	-	3		3	-	3
SMTC configuration	Config 1	μο		<u> </u>	SMT		-	<u> </u>
Swite configuration	Corning i				SIVII	U.Z		

SSB configura	ation	Config 2,3 Config 1,2					U. I				
	ation	Confid 1.7		SMTC.1 SSB.1 FR1							
CSI-RS for tra		<u> </u>									
CSI-RS for tra	1.5	Config 3				SSB.2					
	acking	Config 1				TRS.1.1					
		Config 2				TRS.1.1					
		Config 3		TRS.1.2 TDD							
PDSCH/PDC	ŀ	Config 1,2	kHz			15 k					
subcarrier spa	Ū	Config 3				30kl	Ηz	Т			
EPRE ratio of EPRE ratio of											
EPRE ratio of											
EPRE ratio of											
	PRE ratio of PDCCH to PDCCH DMRS				dB	0	0	0	0	0	0
EPRE ratio of			иБ	U	U		U	U	U		
EPRE ratio of											
		IRS to SSS(Note 1)									
1)	I OCNG 10 C	OCNG DMRS (Note									
		NR_FDD_FR1_A,									
		NR_TDD_FR1_A						-1	14		
		NOTE 6						4.4	<u> </u>		
		NR_FDD_FR1_B NR_TDD_FR1_C						-113.5 -113			
	Config 1,2 NR_FDD_F			-85		-10	<b>)</b> 1				
	Joining 1,2	NR_TDD_FR1_D		-63		101		-112.5			
		NR_FDD_FR1_E,						-112			
		NR_TDD_FR1_E									
Note2		NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kH					-111 -110.5			
N oc		NR_FDD_FR1_A,	Z						0.0		
		NR_TDD_FR1_A						-1	14		
		NR_FDD_FR1_B						-11	3.5		
		NR_TDD_FR1_C							13		
C	Config 3	NR_FDD_FR1_D,		-91		-		-11	2.5		
		NR_TDD_FR1_D						-112.5			
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12		
		NR_FDD_FR1_G						-1	11		
		NR_FDD_FR1_H						-11	0.5		
		NR_FDD_FR1_A,									
		NR_TDD_FR1_A NOTE 6						4	14		
		NR_FDD_FR1_B							3.5		
		NR_TDD_FR1_C		-85					13		
C	Config 1,2	NR_FDD_FR1_D,				-10	01		2.5		
		NR_TDD_FR1_D							12		
Note2		NR_FDD_FR1_E, NR_TDD_FR1_E	dBm/SCS						11 0.5		
		NR_FDD_FR1_G						-11	0.5		
	NR_FDD_FR1_H NR_FDD_FR1_A,										
	Confirm C	NR_TDD_FR1_A NOTE 6		_	0			-1	11		
	Config 3	NR_FDD_FR1_B		-8	ō	_		-11	0.5		
		NR_TDD_FR1_C						-110.5 -110			

		NR_FDD_FR1_D, NR_TDD_FR1_D						-10	9.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	09
		NR_FDD_FR1_G							08
Ê <sub>s</sub> /I <sub>ot</sub>		NR_FDD_FR1_H	dB	-1.	76	-4	.7	-546	7.5 -5.46
$\hat{E}_s/N_{oc}$			dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-118	-118
		NR_FDD_FR1_B NR_TDD_FR1_C						-117.5 -117	-117.5 -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, NR_TDD_FR1_E						-116	-116
SS-		NR_FDD_FR1_G NR_FDD_FR1_H	ID (000					-115 -114.5	-115 -114.5
RSRP <sup>Note</sup>		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS					-115	-115
		NR_FDD_FR1_B NR_TDD_FR1_C						-114.5 -114	-114.5 -114
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		-85	-85	-	-	-113.5	-113.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-113	-113
		NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5	-112 -111.5
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6							
	No.	NR_FDD_FR1_B NR_TDD_FR1_C							
SS-RSRQ	Note3	NR_FDD_FR1_D, NR_TDD_FR1_D	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G							
		NR_FDD_FR1_H NR_FDD_FR1_A,							
		NR_TDD_FR1_A							3.5
		NR_FDD_FR1_B NR_TDD_FR1_C							33 2.5
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-50		-7	70	-8	32
lo <sup>Note3</sup>		NR_FDD_FR1_E, NR_TDD_FR1_E						-8	1.5
10		NR_FDD_FR1_G							0.5
		NR_FDD_FR1_H NR_FDD_FR1_A,							30
		NR_TDD_FR1_A	dBm/						7.4
	Config 3	3 NR_FDD_FR1_B 38.16MHz -50 -		-76.9 -76.4					
		NR_FDD_FR1_D, NR_TDD_FR1_D						-79	5.9

NR_FDD_FR1_E, NR_TDD_FR1_E						-79	5.4
NR_FDD_FR1_G	]					-74	4.4
NR_FDD_FR1_H						-7:	3.9
Propagation condition	-	AWGN	AWGN	AWGN	AWGN	AWG N	AWG N
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  $_N$  to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

#### A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

# A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

#### A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
Falaii	i didilietei		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2		
Dupley mode	Config 1		FDD						
Duplex mode	Config 2,3		TDD						
	Config 1		Not Applicable						
TDD configuration	Config 2				TDDCc	onf.1.1			
	Config 3				TDDCc	onf.2.1			

	Config 1				10: N <sub>RE</sub>	s c = 52			
BW <sub>channel</sub>	Config 2	MHz			10: N <sub>RB</sub>				
2 Chairle	Config 3				40: N <sub>RB</sub> ,				
Gap pattern ID	Config 1,2,3								
Gap pattern iD			-						
DIAID DIAI	Config 1		10: N <sub>RB,c</sub> = 52						
BWP BW	Config 2		10: N <sub>RB,c</sub> = 52						
	Config 3				40: NRB	,c = 106			
DRX Cycle	T	ms		Т	Not App	olicable	T	T	
	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		
	Config 1		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1. 1 FDD		
TRS Configuration	Config 2		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-	
	Config 3		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD		
OCNG Patterns	1			Į.	OCNG p	attern 1		1	
T	Config 1	ms	-	3	-	3	-	3	
Time offset with Cell 1	Config 2,3	μs	-	3	-	3	-	3	
ON ITO C. C.	Config 1	·			SMTC p	attern 2			
SMTC configuration	Config 2,3				SMTC p				
SSB configuration	Config 1,2				SSB patter	n 1 in FR			
_	Config 3		SSB pattern 2 in FR1						
CSI-RS for tracking	Config 1	_	TRS.1.1 FDD						
	Config 2		TRS.1.1 TDD						
	Config 3 Config 1,2		TRS.1.2 TDD  15 kHz						
PDSCH/PDCCH	_	kHz	kHz						
subcarrier spacing Config 3				T	30 k	(Hz	1	1	
EPRE ratio of PSS to SSS	to 000						1		
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC		dB							
	PRE ratio of PBCH to PBCH DMRS PRE ratio of PDCCH DMRS to SSS		0	0	0	0	0	0	
EPRE ratio of PDCCH to PI	OCCH DMRS						1		
EPRE ratio of PDSCH DMR	S to SSS								

	of PDSCH to PD								
	of OCNG DMRS	to SSS(Note 1) NG DMRS (Note 1)							
Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-80	).18	-11	06	-11 -11: -11: -11: -11: -11:	5.5 15 4.5 14
$N_{oc}$ Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-86	3.27	-1	13	-11 -11: -11 -11: -11: -11:	16 5.5 15 4.5 14
Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6  NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H		-80	).18	-106		-11 -11: -11: -11: -11:	5.5 15 4.5 14
Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-83	3.27			-112.5  -113 -112.5 -112  -111.5  -111 -110	
Ê , /I ot	l .	1 = =	dB	-1	.75	-1.	75	-10 <sup>9</sup>	-1.75
$\hat{E}_{s}/N_{oc}$			dB	-1	.75	-1.		3	-1.75
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		11.70				-113	- 117.7 5
SS- RSRP <sup>Not</sup>	Config 1,2	NR_FDD_FR1_B	dBm/SCS	-81.93	-81.93	- 107.75	- 107.75	-112.5	117.2 5
		NR_TDD_FR1_C						-112	116.7 5
		NR_FDD_FR1_D NR_TDD_FR1_D						-111.5	116.2 5

		T	ı				1	1	
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.7 5
		NR_FDD_FR1_G						-110	- 114.7 5
		NR_FDD_FR1_H						-109.5	- 114.2 5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-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
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							
SS-RSRQ <sup>l</sup>	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76 T
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-83.28	- 85.83
		NR_FDD_FR1_B						-82.78	- 85.33
	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D		ب_	50	-75	83	-82.28	84.83
	Comig 1,2	NR_TDD_FR1_D NR_FDD_FR1_E		`	50	73	.00	-81.78	84.33
Io <sup>Note3</sup>		NR_TDD_FR1_E NR_FDD_FR1_G	dBm/SCS					-81.28 -80.28	83.83
		NR_FDD_FR1_H						-79.78	82.83
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-77.19	82.33 - 79.73
	Config 3	NR_FDD_FR1_B			50	-76	.73	-76.69	- 79.23
		NR_TDD_FR1_C						-76.19	78.73

		NR_FDD_FR1_D NR_TDD_FR1_D						-75.69	- 78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	- 77.73
		NR_FDD_FR1_G						-74.19	- 76.73
		NR_FDD_FR1_H						-73.69	- 76.53
Propagation	on condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna c	onfiguration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N}$  \_\_\_\_ to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

# A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

### A.6.7.3 SS-SINR

# A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

#### A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

#### A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		
Parameter		Unit	Cell 1	Cell 1   Cell 2   Cell 1		Cell 2	
SSB ARFCN			fred	freq1 freq1			
Duplex mode	Config 1		FDD				

	Config 2,3			Т	DD	
	Config 1				pplicable	
TDD configuration	Config 2				Conf.1.1	
3	Config 3		TDDConf.2.1			
Downlink initial BWP co				DLBWP.0.1		
Downlink dedicated BV				DLB	WP.1.1	
Uplink initial BWP conf				ULB	WP.0.1	
Uplink dedicated BWP	-			ULB	WP.1.1	
DRX Cycle configuration		ms		Not A	pplicable	
TRS configuration	Config 1		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-
	Config 3		TRS.1.2		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	-
ond mo	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				C	)P.1	
SS-RSSI-Measuremen	t			Not A	pplicable	
Time offset with Cell	Config 1	ms	-	3	-	3
1	Config 2,3	μs	-	3	-	3
SMTC configuration	Config 1			SM	ITC.2	
Sivire configuration	Config 2,3			SM	ITC.1	
SSB configuration	Config 1,2			SSB	.1 FR1	
SSB configuration Config 3				SSB	.2 FR1	
PDSCH/PDCCH Config 1,2		kHz			15	
subcarrier spacing Config 3		NI IZ		_	30	
EPRE ratio of PSS to SSS		4				
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		Ⅎ				
EPRE ratio of PDCCH DN	/IRS to SSS	dB	0	0	0	0
EPRE ratio of PDCCH to EPRE ratio of PDSCH DN		_				
EPRE ratio of PDSCH to	PDSCH	$\exists$				
EPRE ratio of OCNG DMI						

FPRE ratio of OCNG to OCNG DMRS (Note 1)	FPRF ratio	of OCNG to O	CNG DMRS (Note 1)					
NR TDD_FR1_A   NR FDD_FR1_B   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_A   NR TDD_FR1_A   NR TDD_FR1_D   NR FDD_FR1_B   NR TDD_FR1_D   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_C   NR FDD_FR1_D   NR F	LI IL IAIO	<u></u>				L	-11	6
NR FDD FR1 B   NR TDD FR1 D   NR F			NR_TDD_FR1_A					-
NR   TDD   FR1   C   NR   FDD   FR1   D   NR   FDD   FR1   E   NR   FD			NOTE 6					
NR FDD FR1 D   NR FDD FR1 D   NR FDD FR1 E   NR FDD FR1 E   NR FDD FR1 E   NR FDD FR1 E   NR FDD FR1 B   NR FDD FR1 B   NR FDD FR1 D   NR F				]				
N	Note?			dBm/15kH		_		
NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_A, NR_TDD_FR1_B,	N oc				-9:	3	-114	.5
NR. TDD_FR1_G   NR. FDD_FR1_H   -113   -112.5   -112.5   -115   -115   -115   -115   -115				_			4.4	4
NR FDD FR1 B							-114	4
NR_FDD_FR1_H   -93				1			-11	3
Config 1,2				1				
NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_B, NR_FDD_FR1_B,		0	1		0.0	`		
No. No. No. No. No. No. No. No. No. No.		Config 1,2			-9;	<b>5</b>		
Note   NR_FDD_FR1_B								
NR_FDD_FR1_B   NR_FDD_FR1_C   NR_FDD_FR1_D   NR_FDD_FR1_D   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_B   NR_F							-11:	3
NR_TDD_FR1_C				4		i	440	
Config 3	Note2			dPm/909				
NR_TDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E     NR_FDD_FR1_G   NR_FDD_FR1_G   -110   -110     E//I	N oc	Config 3		ubiii/SCS	ر ۵۰	<b>1</b>		
NR FDD FR1 E   NR FDD FR1 E   NR FDD FR1 H		Joining 3			-90	,	-111	.5
NR_TDD_FR1_E   NR_FDD_FR1_H   -110   -109.5				1				4
NR_FDD_FR1_H							-11	1
Response							-110	
REDD_FR1_A, NR_FDD_FR1_B, NR			NR_FDD_FR1_H			_	-109	
NR_FDD_FR1_A, NR_TDD_FR1_B								
NR_TDD_FR1_A   NR_FDD_FR1_B     NR_FDD_FR1_D   NR_FDD_FR1_D     NR_FDD_FR1_E   NR_FDD_FR1_E     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_A     NR_FDD_FR1_A   NR_FDD_FR1_B     NR_FDD_FR1_D   NR_FDD_FR1_D     NR_FDD_FR1_D   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B   NR_FDD_FR1_B     NR_FDD_FR1_B	$E_s/N_{oc}$	1	ND EDD ED4 A	dB	4.54	2.66	-4	-4
NoTE 6   NR_FDD_FR1_B   NR_TDD_FR1_C   NR_FDD_FR1_D   NR_FDD_FR1_D   NR_FDD_FR1_D   NR_FDD_FR1_B   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_B   NR_FDD_FR1							100	100
NR_FDD_FR1_B   NR_TDD_FR1_C   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_A   NR_FDD_FR1_B   NR_F							-120	-120
NR_TDD_FR1_C   NR_FDD_FR1_D   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_B   NR_F				1			-119.5	-119.5
NR_FDD_FR1_D   NR_FDD_FR1_E   NR_FDD_FR1_G   NR_FDD_FR1_G   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_D   NR_FDD_FR1_B   NR_FDD_FR1_D   NR_FDD_FR1_B   NR_F				<u> </u>				
NR_TDD_FR1_D   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_E   NR_FDD_FR1_B					-88.46	- 00.24		
NR_TDD_FR1_E   NR_FDD_FR1_G   NR_FDD_FR1_H		1,∠	NR_TDD_FR1_D			90.34	-118.5	-118.5
SS-RSRPNot e3							-118	-118
NR_FDD_FR1_H   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_B   NR_TDD_FR1_C   NR_FDD_FR1_D   NR_FDD_FR1_B   NR_TDD_FR1_B   NR_TDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_B   NR_F				1				
NR_FDD_FR1_A, NR_TDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_D, NR_TDD_FR1_B   NR_FDD_FR1_B   NR_TDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_B   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_A   NR_FDD_FR1_B   NR_TDD_FR1_B   NR_TDD_FR1_B   NR_TDD_FR1_B   NR_TDD_FR1_B   NR_TDD_FR1_B   NR_FDD_FR1_B			4					
NR_TDD_FR1_A   NR_FDD_FR1_B   NR_TDD_FR1_C     NR_FDD_FR1_D   NR_FDD_FR1_E     NR_FDD_FR1_E   NR_FDD_FR1_E     NR_FDD_FR1_B   NR_FDD_FR1_A     NR_FDD_FR1_A     NR_FDD_FR1_A     NR_FDD_FR1_A     NR_FDD_FR1_A     NR_FDD_FR1_B				dBm/SCS			-110.5	-110.5
NOTE 6	e3						-117	-117
NR_TDD_FR1_C							117	,
NR_TDD_FR1_C			NR_FDD_FR1_B	1			-116.5	-116.5
NR_TDD_FR1_D								
NR_IDD_FR1_E   -115   -115   -115   -115   -115   -115   -115   -115   -115   -115   -114   -114   -114   -114   -113.5   -13.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5   -113.5		Config 3	NR_FDD_FR1_D,		-85.46	87 34	-115.5	
NR_TDD_FR1_E						07.04	4	
NR_FDD_FR1_G							-115	-115
NR_FDD_FR1_H				1			_111	_111
NR_FDD_FR1_A,   NR_TDD_FR1_A   NR_FDD_FR1_B   NR_TDD_FR1_C     SS-SINR Note3   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_TDD_FR1_A		l					110.0	110.0
NOTE 6								
SS-SINR Note3								
SS-SINR Note3				]				
NR_TDD_FR1_D  NR_FDD_FR1_E,  NR_TDD_FR1_E  NR_FDD_FR1_G				]			_	
NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	SS-SINR N	10te3		dB	0	-3.19	-5.46	-5.46
NR_TDD_FR1_E NR_FDD_FR1_G				1				
NR_FDD_FR1_G								
				1				
				1				

		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6			-85.51
		NR_FDD_FR1_B			-85.01
		NR_TDD_FR1_C			-84.51
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-57.5	-84.01
		NR_FDD_FR1_E, NR_TDD_FR1_E			-83.51
		NR_FDD_FR1_G		Ì	-82.51
Io <sup>Note3</sup>		NR_FDD_FR1_H			-82.01
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6			-79.41
		NR_FDD_FR1_B		Ì	-78.91
		NR_TDD_FR1_C	dBm/		-78.41
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D	38.16MHz	-51.41	-77.91
		NR_FDD_FR1_E, NR_TDD_FR1_E			-77.41
		NR_FDD_FR1_G			-76.41
		NR_FDD_FR1_H			-75.91
Propagatio	n condition		-	AV	VGN
	onfiguration	ha waad ayah that hath	-		x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_N$  to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test

on band n51 in this release of the specification

# A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

# A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

# A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

#### A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parameter		Unit		Test 1		Test 2 Test 3		
		Offic	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Config 1		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1 Config 2,3	_			TE			
	Config 1		Not Applicable					
TDD configuration	Config 2	1			TDDC			
	Config 3	_			TDDC	onf.2.1		
Downlink initial BWP con	figuration				DLBW	/P.0.1		
Downlink dedicated BWF	configuration				DLBW			
Uplink initial BWP config	uration				ULBV			
Uplink dedicated BWP co	onfiguration				ULBW	/P.1.1		
DRX Cycle configuration		ms			Not Ap	olicable		
Gap pattern ID			0	-	0	-	0	-
TRS Configuration	Config 1		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.	_	TRS.1.1	_	TRS.1.1	_
	Config 3		1 TDD TRS.1.		TDD TRS.1.2		TDD TRS.1.2	
	Corning 3		2 TDD		TDD		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	-	CR.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1.1 FDD		CCR.1.1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1. 1 TDD	-	CCR.1.1 TDD	-	CCR.1.1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2.1 TDD	
OCNG Patterns					OF	P.1		-
SS-RSSI-Measurement					Not Ap	olicable		
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
THE OHSEL WILL OCH T	Config 2,3	μs	-	3	-	3	-	3

ONTO	<i>r.</i>	Config 1				SMTC p	attern 2			
SMTC con	SMTC configuration Config 2,3			SMTC pattern 1						
SSB confi	guration	Config 1,2		SSB.1 FR1						
000 00111		Config 3		SSB.2 FR1						
PDSCH/PI	DCCH	Config 1,2	kHz			15				
subcarrier	spacing	Config 3	KI IZ			30				
	of PSS to SSS									
	of PBCH DMRS									
	EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS									
	EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0	0	0	
	of PDSCH DMR									
	of PDSCH to PD of OCNG DMRS									
		NG DMRS (Note 1)								
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-119	9.5	
		NR_FDD_FR1_B						-11	9	
Note2		NR_TDD_FR1_C			_			-118	3.5	
N oc	Config 1,2	NR_FDD_FR1_D	dBm/15kHz	-8	8	-108	3.5	-11	8	
		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		
Notes	Config 1,2			-8	8	-108	3.5	Same as 15k		
Note2		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dBm/SCS						6.5	
		NR_TDD_FR1_C						-116 -115.5		
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85		-105.5		-115		
		NR_FDD_FR1_E						-114.5		
		NR_TDD_FR1_E					-114			
	NR_FDD_FR1_G NR_FDD_FR1_H							-112		
$\hat{E}_{s}/I_{ot}$	$\hat{E}_s/I_{ot}$		dB	-1.75	-1.75	20	20	-4.0	-4.0	
$\hat{E}_s/N_{oc}$			dB	-1.7	75	20	)	-4.	0	
SS-		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-123		
RSRP Note3	Config 1,2	NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SCS	-89.	.75	-88	.5	-12 -122		
		NR_FDD_FR1_D NR_TDD_FR1_D						-122		

	1	1	1	1		
		NR_FDD_FR1_E				-121.5
		NR_TDD_FR1_E NR_FDD_FR1_G				-120.5
		NR_FDD_FR1_H				-120.5
		NR_FDD_FR1_A	İ			120
		NR_TDD_FR1_A				-120.5
		NR_FDD_FR1_B				-120
		NR_TDD_FR1_C				-119.5
	Config 3	NR_FDD_FR1_D		-86.75	-85.5	-119
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				-118.5
		NR_TDD_FR1_E NR_FDD_FR1_G				117 5
		NR_FDD_FR1_H				-117.5 -117
		NR_FDD_FR1_A				-117
		NR_TDD_FR1_A				
		NR_FDD_FR1_B				
		NR_TDD_FR1_C				
SS-SINR <sup>N</sup>	lote3	NR_FDD_FR1_D	dB	-1.75	20	-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_FDD_FR1_B	1			-89.59
		NR_TDD_FR1_C	dBm/			-89.09
	Config 1,2	NR_FDD_FR1_D	9.36MHz	-57.83	-60.5	-88.59
		NR_TDD_FR1_D	0.001/11/12			00.00
		NR_FDD_FR1_E				-88.09
		NR_TDD_FR1_E NR_FDD_FR1_G				-87.09
		NR_FDD_FR1_H				-86.59
Io <sup>Note3</sup>		NR_FDD_FR1_A				00.00
		NR_TDD_FR1_A				-84
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C	dDm/			-83
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/ 38.16MHz	-51.73	-54.41	-82.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-82
		NR_FDD_FR1_G				-81
D	NR_FDD_FR1_H				A1A/O14	-80.5
	on condition		-		AWGN	
Antenna c	configuration			<u> </u>	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  $N_{\infty}$  to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in clause 3.5.2.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

### A.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
	3		TDDConf.2.1	TDDConf.2.1
	1		10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2	MHz	10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 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
PMSI CORESET Reference	1		CR.1.1 FDD	CR.1.1 FDD
RMSI CORESET Reference Channel	2	]	CR.1.1 TDD	CR.1.1 TDD
Channel	3		CR.2.1 TDD	CR.2.1 TDD
	1		CCR.1.1 FDD	CCR.1.1 FDD

Dadiasta	4 CODECET	2	T	CCD 4 4 TDD	CCD 4 4 TDD
	ed CORESET	2		CCR.1.1 TDD	CCR.1.1 TDD
Referenc	ce Channel	3		CCR.2.1 TDD	CCR.2.1 TDD
CCD	£:	1	-	SSB.3 FR1	SSB.3 FR1
22R cou	figuration	2	-	SSB.3 FR1	SSB.3 FR1
0010 5	) - 11	3		SSB.4 FR1	SSB.4 FR1
OCNG P	atterns	1~3		OP.1	OP.1
Initial BV	VP Configuration	1~3		DLBWP.0.1	DLBWP.0.1
	-			ULBWP.0.1	ULBWP.0.1
TDO		1	1	TRS.1.1 FDD	TRS.1.1 FDD
TRS con	figuration	2	1	TRS.1.1 TDD	TRS.1.1 TDD
		3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicate	ed BWP configuration	1~3		DLBWP.1.1	DLBWP.1.1
	ū	4.0		ULBWP.1.1	ULBWP.1.1
	onfiguration	1~3		SMTC.1	SMTC.1
	onfigType	1~3		periodic	periodic
reportQu		1~3		ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~3		2	2
	P reporting period	1~3		slot80	slot80
	o of PSS to SSS o of PBCH DMRS to SSS				
EPRF ratio	o of PBCH to PBCH DMRS				
EPRE ratio	o of PDCCH DMRS to SSS				
	o of PDCCH to PDCCH				
DMRS		4 ^			
EPRE ratio	o of PDSCH DMRS to SSS	1~3	dB	0	0
DMRS	o of PDSCH to PDSCH				
	o of OCNG DMRS to				
SSSNote 1	o di della Bivinto to				
	o of OCNG to OCNG				
DMRS Note					
	NR_FDD_FR1_A,				4.47
	NR_TDD_FR1_A				-117
					110 5
<b>A</b> 7	NR_FDD_FR1_B				-116.5
$N_{oc}$	NR_TDD_FR1_C	4.0	ID /45111	04.05	-116
Note2	NR_FDD_FR1_D,	1~3	dBm/15kHz	-94.65	-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,				4.47
	NR_TDD_FR1_A				-117
					440 5
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C			24.2-	-116
	NR_FDD_FR1_D,	1,2		-94.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
A/	NR_TDD_FR1_E		dBm/SSB		444
N <sub>oc</sub>	NR_FDD_FR1_G		SCS		-114 112.5
Note2	NR_FDD_FR1_H		1		-113.5
	NR_FDD_FR1_A,				111
	NR_TDD_FR1_A NOTE 5				-114
					110 F
	NR_FDD_FR1_B	2		04.65	-113.5
	NR_TDD_FR1_C	3		-91.65	-114
	NR_FDD_FR1_D,				-112.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-112
1	NR_TDD_FR1_E		1		1

	ND EDD ED4 C		1	I	111
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
$\hat{E}_{s}/I_{ot}$		1~3	dB	10	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-120
	NR_FDD_FR1_B NR_TDD_FR1_C				-119.5 -119
	NR_FDD_FR1_D,	1,2		-84.65	-118.5
	NR_TDD_FR1_D NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-116
SSB RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5		SCS		-117
	NR_FDD_FR1_B NR_TDD_FR1_C				-116.5 -116
	NR_FDD_FR1_D,	3		-81.65	-115.5
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E NR_FDD_FR1_G				-115 -114
	NR FDD FR1 H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C		dBm/9.36		-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2	MHz	-56.28	-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
10	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		JD /00 40		-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3	dBm/38.16 MHz	-50.19	-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
$\hat{E}_s/N_{oc}$		1~3	dB	10	-3
	tion condition	1~3		AWGN	AWGN
Antenna	configuration	1~3		1x2	1x2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{\ \ ec}$  to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification.

# A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

## A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

# A.6.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	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 <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
BW <sub>channel</sub>	2	MHz	10: N <sub>RB,c</sub> = 52	10: N <sub>RB,c</sub> = 52
	3		40: N <sub>RB,c</sub> = 106	40: N <sub>RB,c</sub> = 106
DDSCH Beforence	1		SR.1.1 FDD	SR.1.1 FDD
PDSCH Reference 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	J	CR.1.1 TDD	CR.1.1 TDD
Chamie	3		CR.2.1 TDD	CR.2.1 TDD
	1		CCR.1.1 FDD	CCR.1.1 FDD

Dedicated CORESET	2		CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3		CCR.2.1 TDD	CCR.2.1 TDD
1.c.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.	1		SSB.3 FR1	SSB.3 FR1
SSB configuration	2	}	SSB.3 FR1	SSB.3 FR1
COD Corniguration	3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~3		OP.1	OP.1
CONC LAGONO	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
SW10 comigaration	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
oor Ke	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			0.0100	0.0100
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		u.b	g .	
DMRS				
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>				
EPRE ratio of OCNG to OCNG DMRS Note 1	-			
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
NR FDD FR1 B			-94.65	-116.5
$N_{oc}$ NR_TDD_FR1_C	1	dBm/15kHz		-116
Note2 NR_FDD_FR1_D, NR_TDD_FR1_D	1~3			-115.5
NR_FDD_FR1_E,	-			-115
NR_TDD_FR1_E NR_FDD_FR1_G	1			_11/
NR_FDD_FR1_H	1			-114 -113.5
<del>                                     </del>	-			-113.5
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	1			-116.5
NR_FDD_FR1_B NR_TDD_FR1_C	1			-116.5
NR_FDD_FR1_D,	1,2		-94.65	-110
NR_TDD_FR1_D	1,4	4D (CC) -DC	-34.00	-115.5
NR_FDD_FR1_E, Note2 NR_TDD_FR1_E		dBm/CSI-RS SCS		-115
NR FDD FR1 G	1			-114
NR_FDD_FR1_H	†			-113.5
NR_FDD_FR1_A,		1		-
NR_TDD_FR1_A	2		-91.65	-114
NR_FDD_FR1_B	3		-91.00	-113.5
NR_TDD_FR1_C	1			-114

			,	T	1
	NR_FDD_FR1_D,				-112.5
	NR_TDD_FR1_D				_
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR FDD FR1 H				-110.5
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NIC_LDD_LICI_II	1~3	dB	10	-3
L <sub>s</sub> / I <sub>ot</sub>	ND EDD ED4 A	1~3	uБ	10	-5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-120
	NOTE 5				
	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				110.0
	NR_FDD_FR1_E, NR_TDD_FR1_E				-118
	NR_FDD_FR1_G				-117
CSI-RS	NR_FDD_FR1_H		dBm/CSI-RS		-116.5
RSRP Note3	NR_FDD_FR1_A,		SCS		
110100	NR_TDD_FR1_A				-117
	NR FDD FR1 B	3		-81.65	-116.5
	NR TDD FR1 C				-116
	NR_FDD_FR1_D,				44E E
	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,			-56.28	07.00
	NR_TDD_FR1_A NOTE 5				-87.28
	NR_FDD_FR1_B	1			-86.78
	NR_TDD_FR1_C		dBm/9.36 MHz		-86.28
	NR_FDD_FR1_D,	1,2			-85.78
	NR_TDD_FR1_D				-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
	NR_FDD_FR1_A, NR_TDD_FR1_A				-81.19
	NOTE 5				-01.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		ID (0.5.1.5		-80.19
	NR_FDD_FR1_D,	3	dBm/38.16	-50.19	
	NR_TDD_FR1_D		MHz		-79.69
	NR_FDD_FR1_E,				-79.19
	NR_TDD_FR1_E				
	NR_FDD_FR1_G NR_FDD_FR1_H				-78.19 -77.60
$\hat{E}_s/N_{oc}$			dB	10	-77.69 -3
	Propagation condition		QD	AWGN	AWGN
		1~3 1~3		1x2	1x2
Antenna configuration			I .		174

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  $\frac{N_{oc}}{}$  to be fulfilled.

Note 3:	RSRP and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification.

# A.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS resource reported by UE in L1-RSRP report (CSI-RS#0 or 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
Duplex filode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
_	Config 3, 6		TDDConf.2.1
	Config 1, 4		10: N <sub>RB,c</sub> = 52 (FDD)
BW <sub>channel</sub>	Config 2, 5	MHz	10: N <sub>RB,c</sub> = 52 (TDD)
	Config 3, 6		40: N <sub>RB,c</sub> = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Channel	Config 3, 6		SR.2.1 TDD
RMSI CORSET reference channel	Config 1, 4		CR.1.1 FDD
RIVISI CORSE I Telefence channel	Config 2, 5		CR.1.1 TDD

	Config 3, 6		CR.2.1 TDD	
	Config 1, 4		CCR.1.1 FDD	
Dedicated CORSET reference	Config 1, 4	<del>-</del>	CCR.1.1 TDD	
channel	Config 3, 6	<del>-</del>	CCR.2.1 TDD	
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD	
COI-ICO for tracking	Config 2, 5	<del> </del>	TRS.1.1 TDD	
	Config 3, 6	<del> </del>	TRS.1.2 TDD	
	Initial DL BWP		DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern <sup>Note1</sup>	Dedicated OL DW1		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	Coming 5, 6		30B.21 K1	
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMF				
EPRE ratio of PDCCH_DMRS to SS		1	0	
EPRE ratio of PDCCH to PDCCH_0		dB		
EPRE ratio of PDSCH_DMRS to SS				
EPRE ratio of PDSCH to PDSCH_D		1		
EPRE ratio of OCNG DMRS to SSS		1		
EPRE ratio of OCNG to OCNG DMI		-		
N <sub>oc</sub> <sup>Note2</sup>		dBm/15 kHz	-104	
A.I. Noto?	Config 1, 2, 4, 5	ID (0.00	-104	
$N_{oc}$ <sup>Note2</sup>	Config 3, 6	dBm/SCS	-101	
Ês/Noc	,	dB	17	
Ês/lot <sup>Note3</sup>		dB	17	
OO DODDNote3	Config 1, 2, 4, 5	-ID (0.00	-87	
SS-RSRP <sup>Note3</sup>	Config 3, 6	dBm/SCS	-84	
OOD DDNote3	Config 1, 2, 4, 5	JD /0.00	-87	
SSB_RP <sup>Note3</sup>	Config 3, 6	dBm/SCS	-84	
IoNote3	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
10,10,000	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition	<u>,                                     </u>		AWGN	
Antenna Configuration and Correlat	on Matrix		1x2	
		Illy allocated and a c	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  $N_{cc}$  to be

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RSRP, SSB\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 2	
			Test 1	Test 2
E-UTRA RF channel number	er		,	
Duplex mode	Config 1, 2, 3		FDD	
	Config 4, 5, 6		T	DD
TDD special subframe	Config 1, 2, 3	N/A		/A
configuration <sup>Note1</sup>	Config 4, 5, 6	6		3
TDD uplink-downlink Config 1, 2, 3			N.	/A
configuration <sup>Note1</sup>	Config 4, 5, 6		,	
BWchannel		MHz	5 MHz: N	RB.c = 25

			10 MHz:	N <sub>RB,c</sub> = 50
				$N_{RB,c} = 50$ $N_{RB,c} = 100$
PDSCH parameters:			20 1011 12. 1	- 100
DL Reference Measureme	nt ChannelNote2			
PCFICH/PDCCH/PHICH	Config 1, 2, 3		5 MHz. F	R.11 FDD
parameters:	Corning 1, 2, 3			R.6 FDD
DL Reference				R.10 FDD
Measurement	Config 4, 5, 6			R.11 TDD
Channel <sup>Note2</sup>	Coning 4, 5, 6			R.6 TDD
Ondriner				R.10 TDD
OCNG Patterns <sup>Note2</sup>	Config 1, 2, 3			P.19 FDD
OCIVO I atterns	Corning 1, 2, 3			OP.6 FDD
				OP.14 FDD
	Config 4, 5, 6			P.10 TDD
	Coning 4, 5, 6			OP.2 TDD
				OP.8 TDD
PBCH_RA	<u> </u>		20 1011 12.	01.0100
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB		dB		0
		uБ	'	o .
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RANote3				
OCNG_RB <sup>Note3</sup>	L D L D A Note 0			T
	Bands FDD_A Note 9,		-91.65	-117
	TDD_A Bands FDD_B1,			
	FDD_B2 Note 10			-116.5
	Bands FDD_C, TDD_C			-116
N <sub>oc</sub> <sup>Note4</sup>	Bands FDD_C, TDD_C	dBm/15kHz		-115.5
	Bands FDD_E, FDD_F			-113.5
	Note 7, TDD_E			-115
	Bands FDD_G Note 8			-114
	Bands FDD_G			-113.5
Ĉ /NI	Banus FDD_H	dB	10	
Ê <sub>s</sub> /N <sub>oc</sub> Ê <sub>s</sub> /I <sub>ot</sub> <sup>Note5</sup>		dВ	10 10	-4 -4
Ls/ lot	Bands FDD_A Note 9,	uБ	10	-4
	TDD A			-121
	Bands FDD_B1, FDD_B2 Note 10			-120.5
				120
RSRP <sup>Note5</sup>	Bands FDD_C, TDD_C	dBm/15kHz	-81.65	-120 110.5
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F			-119
	Note 7, TDD_E			440
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9,			-121
	TDD_A			
	Bands FDD_B1,			-120.5
OOLI DDNote5	FDD_B2 Note 10	JD /4 51 1 1	04.05	400
SCH_RPNote5	Bands FDD_C, TDD_C	dBm/15kHz	-81.65	-120
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F			-119
	Note 7, TDD_E			
	Bands FDD_G Note 8			-118

	Bands FDD_H			-117.5
IO <sup>Note5</sup>	Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H	dBm/Ch BW	-53.45 + 10log(N <sub>RB,⊄</sub> /50)	-87.76 + 10log(N <sub>RB,c</sub> /50) -87.26 + 10log(N <sub>RB,c</sub> /50) -86.76 + 10log(N <sub>RB,c</sub> /50) -86.26 + 10log(N <sub>RB,c</sub> /50) -85.76 + 10log(N <sub>RB,c</sub> /50) -84.76 + 10log(N <sub>RB,c</sub> /50) -84.76 + 10log(N <sub>RB,c</sub> /50)
Propagation Condition			AW	• • • • • • • • • • • • • • • • • • • •
Antenna Configuration and Correlation Matrix				(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 N₀c to be fulfilled.
- Note 5: Ê<sub>s</sub>/I<sub>ot</sub>, RSRP, SCH\_RP and lo 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	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
Duplex mode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.1.2
	Config 1, 4		10: N <sub>RB,c</sub> = 52 (FDD)
BWchannel	Config 2, 5	MHz	10: N <sub>RB,c</sub> = 52 (TDD)
	Config 3, 6		40: N <sub>RB,c</sub> = 106 (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
RMSI CORSET reference channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORSET reference	Config 1, 4		CCR.1.1 FDD
channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.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
	Initial DL BWP		DLBWP.0.1
BWP configurations	Dedicated DL BWP		DLBWP.1.1
BVVP Cornigurations	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern <sup>Note1</sup>			OP.1
SMTC configuration			SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
33B Corniguration	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMR	S		
EPRE ratio of PDCCH_DMRS to SS			
EPRE ratio of PDCCH to PDCCH_D	MRS	dB	0
EPRE ratio of PDSCH_DMRS to SS	S		
EPRE ratio of PDSCH to PDSCH_DI	MRS		
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMRS			
N <sub>oc</sub> <sup>Note2</sup>		dBm/15 kHz	-104
N <sub>oc</sub> Note2	Config 1, 2, 4, 5	dBm/SCS	-104
I VOC	Config 3, 6	ubiii/303	-101
Ê <sub>s</sub> /N <sub>oc</sub>		dB	17
Ê <sub>s</sub> /I <sub>ot</sub> <sup>Note3</sup>		dB	17
SS-RSRQ <sup>Note3</sup>	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6	ubili/303	-84
	Config 3, 6 Config 1, 2, 4, 5		-84 -87
SSB_RP <sup>Note3</sup>	Config 3, 6	dBm/SCS dBm/9.36 MHz	

		Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition				AWGN
Antenna	Configuration and Correlation	on Matrix		1x2
Note 1:	OCNG shall be used such spectral density is achieve			constant total transmitted power
Note 2:				
Note 3:	fulfilled.  Note 3: É <sub>s</sub> /I <sub>ot</sub> , SS-RSRQ, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			ther parameters for information

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	per		1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6	Ţ [	TDD		
TDD special subframe	Config 1, 2, 3			N/A	
configuration <sup>Note1</sup>	Config 4, 5, 6	1		6	
TDD uplink-downlink	Config 1, 2, 3			N/A	
configuration <sup>Note1</sup>	Config 4, 5, 6	1		1	
BW <sub>channel</sub>	<del> </del>	MHz		5 MHz: N <sub>RB,c</sub> = 25	5
			1	10 MHz: N <sub>RB,c</sub> = 5	0
			2	0 MHz: N <sub>RB,c</sub> = 10	00
PDSCH parameters:				-	
DL Reference Measureme	nt Channel <sup>Note2</sup>				
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FD	)
parameters:				10 MHz: R.6 FDE	)
DL Reference			2	20 MHz: R.10 FD	D
Measurement	Config 4, 5, 6			5 MHz: R.11 TDE	)
Channel <sup>Note2</sup>				10 MHz: R.6 TDE	)
			2	20 MHz: R.10 TD	D
OCNG Patterns <sup>Note2</sup>	Config 1, 2, 3		5	MHz: OP.19 FD	D
				10 MHz: OP.6 FD	
			2	0 MHz: OP.14 FD	)D
	Config 4, 5, 6		5 MHz: OP.10 TDD		
			10 MHz: OP.2 TDD		
			2	20 MHz: OP.8 TD	D
PBCH_RA		<u> </u>			
PBCH_RB		_			
PSS_RA		_			
SSS_RA		_			
PCFICH_RB		<u> </u>			
PHICH_RA		<u> </u>			
PHICH_RB		dB		0	
PDCCH_RA		_			
	PDCCH_RB				
PDSCH_RA		_			
PDSCH_RB					
OCNG_RA <sup>Note3</sup>		<u> </u>			
OCNG_RB <sup>Note3</sup>	T			T.	ı
	Bands FDD_A Note 9,				-119.5
	TDD_A	<u> </u>			
N <sub>oc</sub> Note4	Bands FDD_B1,	dBm/15kHz	-83	-104.70	-119
	FDD_B2 Note 10		33	101.70	
	Bands FDD_C, TDD_C				-118.5
	Bands FDD_D				-118

	Dondo EDD E EDD E				I
	Bands FDD_E, FDD_F Note 7, TDD_E				-117.5
	Bands FDD_G Note 8				-116.5
Δ	Bands FDD_H				-116
Ê <sub>s</sub> /N <sub>oc</sub>		dB	-1.75	-4.0	-4.0
Ê <sub>s</sub> /I <sub>ot</sub> Note5	Bands FDD_A Note 9,	dB	-1.75	-4.0	-4.0
	TDD_A				-123.5
	Bands FDD_B1, FDD_B2 Note 10				-123
RSRP <sup>Note5</sup>	Bands FDD_C, TDD_C Bands FDD_D	dBm/15kHz	-84.75	-108.70	-122.5 -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				
RSRQ <sup>Note5</sup>	Bands FDD_C, TDD_C	dB	-14.76	-16.25	-16.25
	Bands FDD_D  Bands FDD_E, FDD_F  Note 7, TDD E			10.20	
	Bands FDD_G Note 8 Bands FDD_H				
	Bands FDD_A Note 9, TDD_A				-90.26 + 10log(N <sub>RB,c</sub> /50)
	Bands FDD_B1, FDD_B2 Note 10				-89.76 + 10log(N <sub>RB,c</sub> /50)
	Bands FDD_C, TDD_C				-89.26 + 10log(N <sub>RB,c</sub> /50)
Io <sup>Note5</sup>	Bands FDD_D	dBm/Ch BW	-53 + 10log(N <sub>RB,c</sub> /50)	-75.46 + 10log(N <sub>RB,c</sub> /50)	-88.76 + 10log(N <sub>RB,c</sub> /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-88.26 + 10log(N <sub>RB,c</sub> /50)
	Bands FDD_G Note 8				-87.26 + 10log(N <sub>RB,c</sub> /50)
	Bands FDD_H				-86.76 + 10log(N <sub>RB,c</sub> /50)
Propagation Condition	l			AWGN	- /
Antenna Configuration ar	nd Correlation Matrix			1x2	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over 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, 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	s only required to be tested in one of the supported test configurations

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
Duplex mode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
	Config 1, 4		10: N <sub>RB,c</sub> = 52 (FDD)
BW <sub>channel</sub>	Config 2, 5	MHz	10: $N_{RB,c} = 52 \text{ (TDD)}$
	Config 3, 6		40: N <sub>RB,c</sub> = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Chamer	Config 3, 6		SR.2.1 TDD
	Config 1, 4		CR.1.1 FDD
RMSI CORSET reference channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
	Config 1, 4		CCR.1.1 FDD

Dodinated CORSET reference	Config 2, 5		CCR.1.1 TDD	
Dedicated CORSET reference				
channel	Config 3, 6		CCR.2.1 TDD	
CSI-RS for tracking			TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
	Initial DL BWP		DLBWP.0.1	
BWP configurations	Dedicated DL BWP		DLBWP.1.1	
BWF configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern <sup>Note1</sup>			OP.1	
SMTC configuration			SMTC.1	
000 " "	Config 1, 2, 4, 5		SSB.1 FR1	
SSB configuration	Config 3, 6	1	SSB.2 FR1	
EPRE ratio of PSS to SSS	, , , , , , , , , , , , , , , , , , ,			
EPRE ratio of PBCH_DMRS to SSS		7		
EPRE ratio of PBCH to PBCH_DMR		=		
EPRE ratio of PDCCH_DMRS to SS		=		
EPRE ratio of PDCCH to PDCCH_D		dB	0	
EPRE ratio of PDSCH_DMRS to SS		1 45	· ·	
EPRE ratio of PDSCH to PDSCH_D		1		
EPRE ratio of OCNG DMRS to SSS	WITCO	1		
EPRE ratio of OCNG to OCNG DMR	25	-		
N <sub>oc</sub> Note2		dBm/15 kHz	-104	
	Config 1, 2, 4, 5		-104	
N <sub>oc</sub> Note2	Config 3, 6	dBm/SCS	-101	
Ês/Noc	Corning 5, 0	dB	17	
Ês/Noc Ês/Iot <sup>Note3</sup>		dВ		
	Config 1 0 1 E	ив		
SS-RS-SINR <sup>Note3</sup>	Config 1, 2, 4, 5	dBm/SCS	-87	
	Config 3, 6		-84	
SSB RP <sup>Note3</sup>	Config 1, 2, 4, 5	dBm/SCS	-87	
	Config 3, 6		-84	
IoNote3	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition			AWGN	
Antenna Configuration and Correlation			1x2	
Note 1: OCNG shall be used such	that both cells are fu	ılly 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  $N_{oc}$  to be fulfilled.

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RS-SINR, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 2		
			Test 1	Test 2	Test 3
E-UTRA RF channel number				1	
Duplex mode	Config 1, 2, 3			FDD	
	Config 4, 5, 6				
TDD special subframe	Config 1, 2, 3		N/A		
configuration <sup>Note1</sup>	Config 4, 5, 6		6		
TDD uplink-downlink	Config 1, 2, 3		N/A		
configuration <sup>Note1</sup> Config 4, 5, 6		1	1		
BWchannel		MHz	5 MHz: N <sub>RB,c</sub> = 25		5
				10 MHz: N <sub>RB,c</sub> = 5	50
			2	$20 \text{ MHz: } N_{RB,c} = 10$	00

- BBOOLL		1			
PDSCH parameters:	ot ChannalNote?			-	
DL Reference Measuremen				C MUL. D 44 EDS	<u> </u>
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDE	
parameters:				10 MHz: R.6 FDE	
DL Reference	0 ( 4 5 0	+		20 MHz: R.10 FD	
Measurement	Config 4, 5, 6			5 MHz: R.11 TDE	
Channel <sup>Note2</sup>				10 MHz: R.6 TDE	
				20 MHz: R.10 TD	
OCNG Patterns <sup>Note2</sup>	Config 1, 2, 3			MHz: OP.19 FD	
				0 MHz: OP.6 FD	
		<u> </u>		0 MHz: OP.14 FC	
	Config 4, 5, 6			MHz: OP.10 TD	
				0 MHz: OP.2 TD	
			2	20 MHz: OP.8 TD	D
PBCH_RA		<u> </u>			
PBCH_RB					
PSS_RA		<u> </u>			
SSS_RA		<u> </u>			
PCFICH_RB		1			
PHICH_RA		<u> </u>			
PHICH_RB		dB		0	
PDCCH_RA		1			
PDCCH_RB		]			
PDSCH_RA					
PDSCH_RB					
OCNG RA <sup>Note3</sup>		†			
OCNG_RB <sup>Note3</sup>		†			
	Bands FDD_A Note 9,				
	TDD_A				-119.5
	Bands FDD_B1,	†			
	FDD_B2 Note 10				-119
an Nova	Bands FDD_C, TDD_C	<u> </u>			-118.5
N <sub>oc</sub> Note4	Bands FDD_D	dBm/15kHz	-88	-108.50	-118
	Bands FDD_E, FDD_F	1			
	Note 7, TDD_E				-117.5
	Bands FDD_G Note 8	†			-116.5
	Bands FDD_H	†			-116
CRS Ê <sub>s</sub> /N <sub>oc1</sub>	Bande i BB_ii	dB	-1.75	20.0	-4.0
CRS Ê <sub>s</sub> /I <sub>ot</sub> Note5		dB	-1.75	20.0	-4.0
	Bands FDD_A Note 9,		3		
	TDD_A				-123.5
	Bands FDD_B1,	†			
	FDD_B2 Note 10				-123
New 5	Bands FDD_C, TDD_C	†			-122.5
RSRP <sup>Note5</sup>	Bands FDD_D	dBm/15kHz	-89.75	-88.50	-122
	Bands FDD_E, FDD_F	†			
	Note 7, TDD_E				-121.5
	Bands FDD_G Note 8	†			-120.5
	Bands FDD_H	†			-120.3
	Bands FDD_A Note 9,				120
	TDD_A				
	Bands FDD_B1,	†			
	FDD_B2 Note 10				
	Bands FDD_C, TDD_C	†			
RS-SINR <sup>Note5</sup>	Bands FDD_C, TDD_C	dB	-1.75	20	-4.0
	Bands FDD_E, FDD_F	1			
	Note 7, TDD_E				
	Bands FDD_G Note 8	1			
		1			
	Bands FDD_H				

IO <sup>Note5</sup>	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	dBm/Ch BW	-53.79 + 10log(N <sub>RB,c</sub> /50)	-60.56 + 10log(N <sub>RB,c</sub> /50)	-93.48 + 10log(N <sub>RB,c</sub> /50) -92.98 + 10log(N <sub>RB,c</sub> /50) -92.48 + 10log(N <sub>RB,c</sub> /50) -91.98 + 10log(N <sub>RB,c</sub> /50) -91.48 + 10log(N <sub>RB,c</sub> /50) -90.48 + 10log(N <sub>RB,c</sub> /50) -90.48 + 10log(N <sub>RB,c</sub> /50) -90.48 +
	Bands FDD_H				
Propagation Condition				AWGN	,
Antenna Configuration and	Correlation Matrix			1x2	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc1 to be fulfilled.
- Note 4a: Void.
- Note 5: CRS  $\hat{E}_s/I_{ot}$ , RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

#### A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

# A.7 NR standalone tests with one or more NR cells in FR2

# A.7.1 SA: RRC\_IDLE state mobility

# A.7.1.1 Cell re-selection to NR

# A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

# A.7.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

#### A.7.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2-1: Supported test configurations

Co	onfiguration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	
T2 end	Active cell		1, 2	Cell2	
condition	Neighbour cells		1, 2	Cell1	
Final	Active cell		1, 2	Cell1	
condition	Neighbour cell		1, 2	Cell2	
RF Chann	el Number		1, 2	1	
Time offset between cells			1, 2	3 µs	Synchronous cells
Access Barring Information		-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC con	SMTC configuration		1, 2	SMTC.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	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not	
_				configured	
T1		S	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2

T2	S	1, 2	135	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	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 T3			
TDD configuration		1, 2	TDDConf.3.1				TDDConf.3.1			
PDSCH RMC		1		SR.3.1 TDD			SR.3.1 TDD			
configuration		2	SR.3.1 TDD		SR.3.1 TDD					
RMSI CORESET		1	CR.3.1 TDD			CR.3.1 TDD				
RMC configuration		2	CR.3.1 TDD			CR.3.1 TDD				
Dedicated CORESET		1	С	CR.3.1 TD	D	CCR.3.1 TDD				
RMC configuration		2		CR.3.1 TD		CCR.3.1 TDD				
SSB configuration		1	SSB.3 FR2			SSB.7 FR2				
		2	SSB.4 FR2				SSB.8 FR2			
OCNG Pattern		1, 2	OP.4			OP.4				
BW <sub>channel</sub>	MHz	1, 2	10	00: N <sub>RB,c</sub> =	66	10	100: $N_{RB,c} = 66$			
Data RBs allocated		1, 2		66			66			
Initial DL BWP		1, 2		DLBWP.0.	1		DLBWP.0.	1		
configuration										
Initial UL BWP		1, 2	ULBWP.0.1			ULBWP.0.1				
configuration										
RLM-RS		1, 2	SSB		SSB					
Qrxlevmin	dBm/SCS	1	-138		-138					
		2	-135		-135					
Pcompensation	dB	1, 2		0		0				
Qhysts	dB	1, 2		0		0				
Qoffset <sub>s, n</sub>	dB	1, 2		0			0			
Cell_selection_and_ reselection_quality_m easurement		1, 2	SS-RSRP		SS-RSRP					
AoA setup		1, 2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1				
Beam assumption <sup>Note</sup>		1,2		Rough		Rough				
$\hat{E}_{\scriptscriptstyle S}/I_{ot~{ m BB}}$ Note 5	dB	1	7.45	-3.55	0.95	-infinity	0.95	-3.55		
		2								
$N_{oc}$ Note2	dBm/SCS	1				93 90				
		2								
$N_{oc}$ Note2	dBm/15 kHz	1			-1	02				
		2								
$\hat{E}_{s}/N_{oc}$	dB	1	8	-3	1.5	-infinity	1.5	-3		
		2					_			
SS-RSRP Note3	dBm/SCS	1	-85	-96	-91.5	-infinity	-91.5	-96		
		2	-82	-93	-88.5	-infinity	-88.5	-93		
lo on SSB symbols of	dBm/95.04 MHz	1	-60.53	-67.40	-65.34	-69.17	-65.34	-67.40		
each cell		2	-57.52	-64.39	-62.33	-66.16	-62.33	-64.39		
Treselection	S	1, 2	0	0	0	0	0	0		
SintrasearchP	dB	1, 2		50			50			

Propagat	tion		1, 2	AWGN
Condition	า		·	
Note 1:		be used such that be hieved for all OFDM		allocated and a constant total transmitted power spectral
Note 2:	Interference	from other cells and	noise sources no	t specified in the test is assumed to be constant over
Note 3:	SS-RSRP le	vels have been deri	e modelled as AW ved from other pa	GN of appropriate power for $\stackrel{N}{}_{\!$
NI-1- 4	parameters t			O.4.O. and the second limitable includes a station on test and second
Note 4:	implementation a		eam is given in B.	2.1.3, and does not limit UE implementation or test system
Note 5:	Refsens requ		.3.2 of TS 38.101	ternal noise up to the value assumed for the associated -2 [19], and an allowance of 1dB for UE multi-band relaxation 4.

# 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 Registration procedure for mobility and periodic registration update 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 Registration procedure for mobility and periodic registration update 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:

 $T_{\text{detect, NR\_Intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\ T_{\text{evaluate, NR\_intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\$ 

T<sub>SI-NR</sub> 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 o	Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment
	T A II		configuration	0 110	
Initial	Active cell	_	1, 2 1, 2	Cell2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2	Cell1	phase and during T1 period the UE
		_			reselects to cell 1
T1 end			1, 2	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2	Cell2	during T1
T3 end	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2	Cell1	with higher priority during T3
RF Channe			1, 2	1, 2	
Time offset	Time offset 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	juration		1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC con	figuration		1, 2	SMTC.1	
	DRX cycle length		1, 2	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not	
				configured	
T1		S	1, 2	35	T1 needs to be defined so that cell reselection 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	Т3		1, 2	95	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter Unit		Test	Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1			
PDSCH RMC		1, 2	SR.3.1 TDD			SR.3.1 TDD		
configuration								

CR.3.1 TDD

CR.3.1 TDD

RMSI CORESET

1, 2

dBm/SCS	1, 2 1, 2 1, 2 1, 2 1, 2 1, 2 1, 2 1, 2	OP.1 de	efined in A. LBWP.0.1 LBWP.0.1 SSB -140 -137		OP.1 d	efined in A.DLBWP.0.1  JLBWP.0.1  SSB		
dB dB	1, 2 1, 2 1, 2 1, 2 1, 2 1, 2 1, 2 1, 2	OP.1 de	efined in A. LBWP.0.1 LBWP.0.1 SSB -140 -137		OP.1 d	efined in A. DLBWP.0.1 JLBWP.0.1		
dB dB	1, 2 1, 2 1, 2 1 2 1, 2 1, 2 1, 2	D	LBWP.0.1 LBWP.0.1 SSB -140 -137	3.2.1	D	JLBWP.0.1	.3.2.1	
dB dB	1, 2 1, 2 1, 2 1 2 1, 2 1, 2 1, 2	D	LBWP.0.1 LBWP.0.1 SSB -140 -137	3.2.1	D	JLBWP.0.1	.3.2.1	
dB dB	1, 2 1, 2 1 2 1, 2 1, 2 1, 2		SSB -140 -137			JLBWP.0.1		
dB dB	1, 2 1 2 1, 2 1, 2 1, 2	U	SSB -140 -137		U			
dB dB	1, 2 1 2 1, 2 1, 2 1, 2	0	SSB -140 -137					
dB dB	1 2 1, 2 1, 2 1, 2		-140 -137			SSB		
dB dB	1 2 1, 2 1, 2 1, 2		-140 -137			SSB		
dB dB	2 1, 2 1, 2 1, 2		-137					
dB	1, 2 1, 2 1, 2					-140		
dB	1, 2 1, 2		Λ			-137		
	1, 2		0			0		
dB	1, 2 1, 2		0			0		
	1, 2		0		0			
		SS-RSRP		SS-RSRP				
	1, 2 1,2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1			
	1,2		Rough		Rough			
dB	1	9.95	9.95	7.45	-11.05	-infinity	7.95	
	2							
dBm/SCS			-93		-93			
	2		-90					
dBm/15 kHz	1		-102					
	2							
dB	1	10.5	10.5	8	-10.5	-infinity	8.5	
	2							
dBm/SCS	1	<del></del> 82.5	-82.5	-85	-103.5	-infinity	-84.5	
	2	-79.5	-79.5	-82	-100.5	-infinity	-81.5	
Bm/95.04 MHz	1, 2	-53.11	-53.11	-55.34	-63.61	-63.98	-54.91	
S		0	0	0		0	0	
dB	1, 2		50					
dB			48			48		
	1. 2					AWGN		
	· , <b>–</b>	I				AWGN		
		1				AWGN		
	dBm/15 kHz  dB  dBm/SCS  Bm/95.04 MHz S	2 dBm/15 kHz 1 2 dB 1 2 dBm/SCS 1 2 Bm/95.04 MHz 1, 2 s 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2	2 dBm/15 kHz 1 2 dB 1 10.5 2 dBm/SCS 1 -82.5 2 -79.5 3m/95.04 MHz 1, 2 -53.11 s 1, 2 0 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2 dB 1, 2	2 -90 dBm/15 kHz 1 -102  dB 1 10.5 10.5  dBm/SCS 1 -82.5 -82.5 2 -79.5 -79.5  3m/95.04 MHz 1,2 -53.11 -53.11 s 1,2 0 0 dB 1,2 dB 1,2 48 dB 1,2 44 dB 1,2 50	2     -90       dBm/15 kHz     1     -102       dB     1     10.5     10.5     8       dBm/SCS     1     -82.5     -82.5     -85       2     -79.5     -79.5     -82       3m/95.04 MHz     1, 2     -53.11     -53.11     -55.34       s     1, 2     0     0     0       dB     1, 2     48       dB     1, 2     44       dB     1, 2     44       dB     1, 2     50	2 -90  dBm/15 kHz 1 -102  dB 1 10.5 10.5 8 -10.5  dBm/SCS 1 -82.5 -82.5 -85 -103.5  2 -79.5 -79.5 -82 -100.5  3m/95.04 MHz 1, 2 -53.11 -53.11 -55.34 -63.61  s 1, 2 0 0 0 0 0  dB 1, 2 50  dB 1, 2 48  dB 1, 2 48  dB 1, 2 50	2     -90       dBm/15 kHz     1     -102     -102       dB     1     10.5     10.5     8     -10.5     -infinity       dBm/SCS     1     -82.5     -82.5     -85     -103.5     -infinity       2     -79.5     -79.5     -82     -100.5     -infinity       3m/95.04 MHz     1, 2     -53.11     -53.11     -55.34     -63.61     -63.98       s     1, 2     0     0     0     0     0       dB     1, 2     48     48       dB     1, 2     44     44       dB     1, 2     44     44       dB     1, 2     50     50	

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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

# 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 on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update 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<sub>evaluate, NR\_ inter</sub> See Table 4.2.2.4-1 in clause 4.2.2.4

T<sub>SI-NR</sub> 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

С	onfig	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

Pa	rameter	Unit	Value	Comment
Initial conditions	Initial conditions		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Final condition		Cell 2	
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		1124	Cell 1	Cell 2	
		Unit	T1 T2	T1 T2	
Assumption for UE bean	ns <sup>Note 6</sup>		N/A	Rough	
AoA setup			NA	Setup 1 as defined in A.3.15	
NR RF Channel Number	•		1	2	
Duplex mode	Config 1		FDD	TDD	
	Config 2,3		TDD	TDD	
	Config 1		Not Applicable	TDDConf.3.1	
TDD configuration	Config 2		TDDConf.1.1	TDDConf.3.1	
	Config 3		TDDConf.2.1	TDDConf.3.1	
	Config 1		10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
BW <sub>channel</sub>	Config 2	MHz	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
	Config 3		40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66	
	Config 1		10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
BWP BW	Config 2	MHz	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
	Config 3		40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66	
	Config 1		52	66	
Data RBs allocated	Config 2		52	66	
	Config 3		106	66	
DRx Cycle		ms	Not Applicable		
	Config 1		SR.1.1 FDD	SR.3.1 TDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	SR.3.1 TDD	
	Config 3		SR2.1 TDD	SR.3.1 TDD	
	Config 1		CR.1.1 FDD	CR.3.1 TDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	CR.3.1 TDD	
	Config 3		CR2.1 TDD	CR.3.1 TDD	

		T	T	T	
Control Channel RMC	Config 1		CCR.1.1 FDD	CCR.3	.1 TDD
	Config 2		CCR.1.1 TDD	CCR.3	.1 TDD
	Config 3		CCR.2.1 TDD	CCR.3	.1 TDD
OCNG Patterns			OF	OP.1	
	Config 1,2		SSB.1 FR1	SSB.1 FR1 SSB.3 F	
SSB configuration	Config 3		SSB.2 FR1	SSB.3	3 FR2
	Config 1,2		SSB.1 FR1	SSB.3	3 FR2
SSB configuration	Config 3	-	SSB.2 FR1	SSB.3	3 FR2
	Config 1,2		SMTC.1	SMT	
SMTC configuration	Config 3		SMTC.2	SMT	
PDSCH/PDCCH	Config 1,2		15 kHz		kHz
subcarrier spacing	Config 3	kHz	30 kHz		kHz
	Config 1,2		15 kHz		kHz
PUCCH/PUSCH subcarrier spacing	Config 3	kHz	30 kHz		
PRACH configuration			FR1 PRACH configuration	120 kHz FR2 PRACH configuration	
			1		1
TRS configuration	Config 1		TRS.1.1 FDD	TRS.2.	
	Config 2 Config 3	_	TRS.1.1 TDD TRS.1.2 TDD	TRS.2	
PDSCH/PDCCH TCI			N/A	TRS.2.1 TDD TCI.State.2	
BWP configuration	Initial DL BWP		DLBWP.0.1	DLBWP.0.1	
DWI Comiguration	Dedicated DL		DLBWP.1.1	DLBW	
	BWP		DEDVVF.1.1	DLBV	7
	Initial UL BWP		ULBWP.0.1 UI		/P.0.1
	Dedicated UL		ULBWP.1.1	ULBW	/P.1.1
EPRE ratio of PSS to	BWP				
EPRE ratio of PBCH I		=			
EPRE ratio of PBCH t					
EPRE ratio of PDCCH					
EPRE ratio of PDCCH EPRE ratio of PDSCH		dB	0	(	)
EPRE ratio of PDSCF		-			
	DMRS to SSS(Note 1)				
	to OCNG DMRS (Note				
Note2	1) Note?			-10	4.7
N oc		dBm/15kH z		0/	- 7
Note2 Config 1,2		dBm/SCS		-95.7	
Config 3	Config 3			-95	5.7
Ê , /I or		dB	Link only, see clause A.3.7A	-Infinity	10
$\hat{E}_{s}/N_{oc}$		dB		-Infinity	10
Config 1,2	2	dBm/ BW		-66.7	-56.3
Io <sup>Note3</sup> Config 3	Config 3			-66.7	-56.3
Propagation condition		BW -	1	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 $_{N_{\infty}}$ 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
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

# A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 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<sub>interrupt</sub>, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 562$  ms in the test.  $T_{interrupt}$  is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

# A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

## A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

#### A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Pa	rameter	Unit	Value	Comment
Initial conditions	Initial conditions		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
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	

TO	•	<10	
12	S	≤10	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Parameter		Unit	Ce T1	II 1 T2	Ce T1	II 2 T2	
Assumption for UE bea		Rou			ugh		
AoA setup			Setup 1 as de	fined in A.3.15			
NR RF Channel Numb		1			1		
Duplex mode				TDD			
TDD configuration			TDDConf.3.1				
BW <sub>channel</sub>		MHz			RB,c = 66		
BWP BW		MHz			RB,c = 66		
Data RBs allocated					6		
DRx Cycle		ms			plicable		
PDSCH Reference me					1 TDD		
	rence Channel			CR.3.			
Control Channel RMC					.1 TDD		
OCNG Patterns				OF			
SMTC Configuration				SMTC p			
SSB Configuration		1.1.1			3 FR2		
PDSCH/PDCCH subc		kHz			kHz		
PUCCH/PUSCH subca PRACH configuration	arrier spacing	kHz		FR2 PRACH (	kHz		
TRS configuration					.1 TDD		
PDSCH/PDCCH TCI s	tate				tate.2		
BWP configuration	Initial DL BWP			DLBWP.0.1			
<b>J</b>	Dedicated DL BWP			DLBWP.1.1			
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP			ULBWP.1.1			
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH D							
EPRE ratio of PBCH to							
EPRE ratio of PDCCH							
EPRE ratio of PDCCH EPRE ratio of PDSCH		dB	C	)	(	0	
EPRE ratio of PDSCH							
EPRE ratio of OCNG I							
EPRE ratio of OCNG t							
1)							
Note2		dBm/15kH		-104.7			
N oc		Z					
Note2 N oc			05.7				
		dBm/SCS	-95.7				
Ê , /I <sub>st</sub>		dB	6	-1.8	-Infinity	0	
$\hat{E}_{s}/N_{oc}$	dB	6	6	-Infinity	7		
			Ĭ	<u>_</u>	y	•	
Io <sup>Note3</sup>		dBm/ BW	-59.7	-56.7	-59.7	-56.7	
		DVV					
D			A14.	ON	A	ON	
Propagation condition		-	AW	GN	AW	GN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{\infty}}$ 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
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

# A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 232 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<sub>interrupt</sub>, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 222$  ms in the test.  $T_{interrupt}$  is defined in clause 6.1.1.4.2.

This gives a total of 232 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 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.7.3.1.3.2-1: 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

Par	ameter	Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between	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

Dara	meter	Unit	Се		Cell 2		
		Oilit	T1	T2	T1	T2	
Assumption for UE be	ams <sup>Note 6</sup>		Ro	Ro fined in A.3.15	ugh		
AoA setup							
NR RF Channel Numb	per			l ————————————————————————————————————		2	
Duplex mode				TDDC			
TDD configuration		MHz		TDDC:			
BW <sub>channel</sub>		MHz			$R_{B,c} = 66$ $R_{B,c} = 66$		
Data RBs allocated		IVITIZ			6		
DRx Cycle		ms		Not App			
PDSCH Reference me RMSI CORESET Refe				SR.3.	1 TDD		
Control Channel RMC				CCR.3			
OCNG Patterns				OF			
SMTC Configuration SSB Configuration				SMTC p	attern 1 3 FR2		
PDSCH/PDCCH subc	arriar anasina	Id I=					
PUCCH/PUSCH subc		kHz kHz			kHz kHz		
PRACH configuration	KIIZ		FR2 PRACH (				
TRS configuration				.1 TDD			
PDSCH/PDCCH TCI s		TCI.State.2					
BWP configuration	Initial DL BWP		DLBWP.0.1				
_ · · · · · · · · · · · · · · · · · · ·	Dedicated DL BWP			DLBW			
	Initial UL BWP		ULBWP.0.1				
	Dedicated UL BWP		ULBWP.1.1				
EPRE ratio of PSS to	SSS						
EPRE ratio of PBCH [	OMRS to SSS						
EPRE ratio of PBCH t							
EPRE ratio of PDCCH			0		0		
EPRE ratio of PDCCH		dB					
EPRE ratio of PDSCH							
EPRE ratio of PDSCH							
EPRE ratio of OCNG							
1)	to OCNG DMRS (Note						
		dBm/15kH					
$N_{oc}$ Note2		Z Z	-10	4.7	-104.7		
Note2							
N oc		dBm/SCS	-95	5.7	-95	5.7	
		ubili/SCS	30				
Ê , /I oc		dB	5	5	-Infinity	5	
$\hat{E}_{s}/N_{oc}$	dB	5	5	-Infinity	5		
		<u> </u>	<u>_</u>	ппппц			
Io <sup>Note3</sup>	dBm/	-60.5	-60.5	-66.7	-60.5		
		BW			_		
Dunnana (la 199			A 1 4 4	ON .	A 1 A 1	ION	
Propagation condition Note 1: OCNG shall	Il be used such that both		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.
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:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test
	system implementation

# A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 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].

 $T_{interrupt} = 542$  ms in the test.  $T_{interrupt}$  is defined in clause 6.1.1.4.2.

This gives a total of 552 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 Channe	el Number		1	1	
Time offset 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 Barring Information	-	1	Not Sent	No additional delays in random access
				procedure.
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	
PRACH configuration		1	FR2	Table A.3.8.3.1-1
			PRACH	
			configurati	
			on 1	
T1	S	1	5	
T2	S	1	5	Time for the UE to detect RLF
T3	S	1	5	

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	
Assumption for UE			Rough			Rough			
beams <sup>Note 4</sup>			_			_			
TDD configuration		1		DDConf.3.			DDConf.3.		
BW <sub>channel</sub>	MHz	1	10	$0: N_{RB,c} = 6$	66	10	0: N <sub>RB,c</sub> =	66	
Data RBs allocated		1		24			24		
PDSCH RMC		1	S	SR.3.1 TDD	)		N/A		
configuration									
RMSI CORESET		1	C	CR.3.1 TDD	)		CR.3.1 TDI	)	
RMC configuration									
Dedicated CORESET		1	C	CR.3.1 TDI	D	С	CR.3.1 TD	D	
RMC configuration									
TRS configuration		1	TRS.2.1 TDD			N/A			
PDSCH/PDCCH TCI		1		ΓCI.State.2		N/A			
state									
OCNG Pattern		1	OP.1 c	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	Ų	JLBWP.0.1		ULBWP.0.1			
configuration									
RLM-RS		1		SSB		SSB			
AoA setup		1	Setup 1	defined in /	A.3.15.1	Setup 1 defined in A.3.15.1			
Ê s /I ot	dB	1	-0.12	-infinity	-infinity	-3.46	2	2	
$N_{oc}$ Note2	dBm/15 kHz	1	-104.7						
$N_{oc}$ Note2	dBm/SCS	1	-95.7						
$\hat{E}_{s}/N_{oc}$	dB	1	4	-infinity	-infinity	2	2	2	
SS-RSRP Note3	dBm/SCS	1	-91.7	-infinity	-infinity	-93.7	-93.7	-93.7	
lo	dBm/95.04 MHz	1	-59.64	-62.59	-62.59	-59.94	-62.59	-62.59	
Propagation		1		•	AWG	iN	•	•	
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  $\frac{N_{oc}}{N_{oc}}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

# 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 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish\_delay}} = T_{UL\_grant} + T_{UE\_re\text{-establish\_delay}}.$$

Where:

 $T_{UL\_grant} = It$  is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence  $T_{UL\_grant}$  is not used.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$ 

 $T_{identify intra NR} = 3250 \text{ ms}$ 

T<sub>SI</sub> = 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<sub>PRACH</sub> = 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.7.3.2.1.2 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 Channe	el Number		1	1, 2	
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		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Barring Information		-	1	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR2	·
SMTC con			1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co	nfiguration		1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1		S	1	5	
T2		S	1	5	Time for the UE to detect RLF
T3		S	1	6	

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test		Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3	
Assumption for UE beams <sup>Note 4</sup>				Rough			Rough		
AoA setup		1		Setup 3 a	as specified	in clause	A.3.15		
				AoA1			AoA2		
TDD configuration		1	Т	TDDConf.3.1			TDDConf.3.1		
BW <sub>channel</sub>	MHz	1	100: N <sub>RB,c</sub> = 66			100: N <sub>RB,c</sub> = 66			
Data RBs allocated		1	24			24			
PDSCH RMC		1	;	SR.3.2 TDD		N/A			
configuration									
RMSI CORESET		1	(	CR.3.1 TDE	)	CR.3.1 TDD			
RMC configuration									
Dedicated CORESET		1	CCR.3.1 TDD		CCR.3.1 TDD		D		
RMC configuration									
TRS configuration		1	TRS.2.1 TDD			N/A			
PDSCH/PDCCH TCI		1	TCI.State.2			N/A			
state									

OCNG Pattern		1	OP.3 defined in A.3.2.1			OP.3	OP.3 defined in A.3.2.1		
Initial DL BWP configuration		1	DLBWP.0.1			DLBWP.0.1			
Initial UL BWP configuration		1		ULBWP.0.1		ULBWP.0.1			
RLM-RS		1		SSB			SSB		
$N_{oc}$ Note2	dBm/15 kHz	1		-92.1			-92.1		
$N_{_{OC}}$ Note2	dBm/SCS	1		-83.1			-83.1		
Ê s / N oc	dB	1	0	-infinity	-infinity	- infinity	-infinity	0	
$\hat{E}_{s}/I_{ot}_{BB}$ Note 5	dB	1	-1.01	-infinity	-infinity	- infinity	-infinity	-1.01	
SSB_RP Note3	dBm/SCS	1	-83.1	-infinity	-infinity	- infinity	-infinity	-83.1	
lo	dBm/95.04 MHz	1	-55.46	-58.51	-58.51	-58.51	-58.51	-55.46	
Propagation Condition		1	AWGN		AWGN				

Note 1: OCNG shall be used such that a constant total transmitted power 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: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

#### 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.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$ 

 $T_{identify\_intra\_NR} = 1600 \ ms$ 

 $T_{identify\_inter\_NR} = 2080 \ ms$ 

 $T_{SI} = 1280$  ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

 $T_{PRACH}$ = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

## A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

## A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311	T311		1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR2	
SMTC con	figuration		1	SMTC pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co			1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1		S	1	5	
T2		s	1	11	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	T3
Assumption for UE beams <sup>Note 4</sup>			Rough		Rough			
TDD configuration		1	Т	DDConf.3.	1	Т	DDConf.3.	1
PDSCH RMC		1	S	SR.3.1 TDD	)		N/A	
configuration								
RMSI CORESET		1	C	CR.3.1 FDD	)		R.3.1 FD	)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 FDI	)	C	CR.3.1 FD	D
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
PDSCH/PDCCH TCI		1	٦	ΓCI.State.2			N/A	
state								
OCNG Pattern		1		defined in A		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		ι	JLBWP.0.1	
configuration								
RLM-RS		1		SSB		SSB		
AoA setup		1		defined in A			defined in	
Ê s /I ot	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
$N_{oc}$ Note2	dBm/15kHz	1	-104.7					
$N_{_{OC}}$ Note2	dBm/SCS	1	-95.7					
$\hat{E}_{s}/N_{oc}$	dB	1	5 -infinity -infinity		-infinity	-infinity	5	
SS-RSRP Note3	dBm/SCS	1	-90.7	-infinity	-infinity	-infinity	-infinity	-90.7
lo	dBm/95.04 MHz	1			-60.52			
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  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### 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.

$$T_{UE\_re-establish\_delay} = 50 \text{ ms} + T_{identify\_intra\_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify\_inter\_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$ 

 $T_{identify\ intra\ NR} = 3520\ ms$ 

T<sub>SI</sub> = 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 capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description					
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Paramet	er	Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking Config 1			TRS.2.1 TDD	
Duplex Mode for Cell 1	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	As defined in A.3.1.4
BW <sub>channel</sub>	Config 1	MHz	100: N <sub>RB,c</sub> = 66	
Data RBs allocated	Config 1		24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference	PDSCH Reference Config 1		SR.3.1 TDD	As defined in A.3.1.1.
Channel Note 2				
RMSI CORESET	Config 1		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
NR RF Channel Number			1	
EPRE ratio of PSS to SS	S	dB		
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB	0	
EPRE ratio of PDCCH_D	MRS 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		
ss-PBCH-BlockPower	dBm/ SCS	+20 +Δ <sub>UL</sub>	As defined in TS 38.331 [2].  Δ <sub>UL</sub> is derived from the uplink calibration process Note 3
Configured UE transmitted power (  P CMAX, f, c  )	dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
PRACH Configuration		FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below
rsrp-ThresholdSSB	dBm	RSRP_69 +∆dl	RSRP_69 corresponds to -88dBm. Δ <sub>DL</sub> is derived from the downlink calibration process Note 4
preambleReceivedTargetPower	dBm	-100	As defined in TS 38.331 [2]

- Note 1: OCNG shall be used such that 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.
- Note 3: The ΔυL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The  $\Delta_{DL}$  value is calculated as (RSRP\_REP RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value.

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 1	As defined in A.3.15.1
Assumption	for UE beams <sup>Note 3</sup>		Rough	
7 loodin palon lo	Es Note1	dBm/SCS	-80.6	Power of SSB with index
	SSB_RP	dBm/SCS	-80.6	0 is set to be above
SSB with				configured rsrp-
index 0				ThresholdSSB
index 0	Es/lot <sub>BB</sub>	dB	21.09	
	lo	dBm/95.04	-56.01	lo in symbols containing
		MHz		SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
	SSB_RP	dBm/SCS	-95.0	1 is set to be below
CCD with				configured rsrp-
SSB with index 1				ThresholdSSB
index i	Es/lot <sub>BB</sub>	dB	6.69	
	lo	dBm/95.04	-70.41	lo in symbols containing
		MHz		SSB index 1
Propagation	Condition	-	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: Void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.7.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

#### A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

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

#### A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

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

## A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

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

#### A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

#### A.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

### A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable 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). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	TRS.2.1 TDD	
CSI-RS Configuration	Config 1		N/A	CSI-RS.3.1 TDD	As defined in A.3.1.4
Duplex Mode for Cell 1	Config 1		TDD	TDD	
TDD Configuration	Config 1		TDDConf.3.1	TDDConf.3.1	
BW <sub>channel</sub>	Config 1	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> =66	
Data RBs allocated	Config 1		24	24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
RMSI CORESET Refer	rence	Config 1		CR.3.1 TDD	CR.3.1 TDD
NR RF Channel Number	er		1	1	
EPRE ratio of PSS to S		dB			
EPRE ratio of PBCH_D		dB			
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_ SSS	_DMRS to	dB		0	
EPRE ratio of PDCCH PDCCH_DMRS	to	dB	0 0		
EPRE ratio of PDSCH_ SSS	DMRS to	dB			
EPRE ratio of PDSCH PDSCH_DMRS	to	dB			
ss-PBCH-BlockPower			+20 +ΔuL	+20 +ΔUL	As defined in TS 38.331 [2]. Δ <sub>UL</sub> is derived from the uplink calibration process Note 3
Configured UE transmi	tted power (	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 [19]
PRACH Configuration			FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3, with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +∆ <sub>DL</sub>	RSRP_69 +Δ <sub>DL</sub>	RSRP_69 corresponds to -88dBm. Δ <sub>DL</sub> is derived from the downlink calibration process Note 4
preambleReceivedTarg	getPower	dBm	-100	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that 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.

Note 3: The Δ<sub>UL</sub> value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.

Note 4: The  $\Delta_{DL}$  value is calculated as (RSRP\_REP - RSRP\_76), where RSRP\_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP\_x, x is treated as a positive integer value.

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 1	Setup 1	As defined in A.3.15.1
Assumption	for UE beams <sup>Note 3</sup>		Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/lot <sub>BB</sub>	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below
SSB with	SSB_RP	dBm/SC S	-95.0	-95.0	configured rsrp- ThresholdSSB
index 1	Es/lot <sub>BB</sub>	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	lo in symbols containing SSB index 1
Propagation	Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

#### A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

#### A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

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

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

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

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

#### A.7.3.2.3 SA: RRC Connection Release with Redirection

#### A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

## A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

#### A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	3.2	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Ce	Cell 1		II 2
Farameter	Offic	T1	T2	T1	T2
Assumption for UE beamsNote 6		Ro	ugh	Ro	ugh
AoA setup			Setup 1 as det	fined in A.3.15	
NR RF Channel Number			1		2
Duplex mode			TD	DD	
TDD configuration			TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	100: N <sub>RB,c</sub> = 66			
BWP BW	MHz	100: $N_{RB,c} = 66$			
Data RBs allocated		66			
DRx Cycle	ms		Not Applicable		
PDSCH Reference measurement channel			SR.3.1 TDD		
RMSI CORESET Reference Channel		CR.3.1 TDD			
Control Channel RMC			CCR.3.1 TDD		
OCNG Patterns			OP.1		
SMTC configuration			SMTC.1 FR2		
SSB Configuration			SSB.3 FR2		

PDSCH/PDCCH subca	arrier spacing	kHz		120	kHz	
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration				FR2 PRACH of	configuration 1	
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI s	tate		TCI.State.2			
BWP configuration	Initial DL BWP			DLBW	/P.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 3	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		ID.				,
EPRE ratio of PDSCH		dB	(	)	C	)
EPRE ratio of PDSCH						
EPRE ratio of OCNG I						
EPRE ratio of OCNG t						
1)	· ·					
$N_{oc}^{Note2}$		dBm/15kH	-104.7		-104.7	
$IV_{oc}$		Z				
$N_{oc}^{ m Note2}$		dBm/SCS	-95	5.7	-95	5.7
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	5	5	-Infinity	5
$\hat{E}_s/N_{oc}$		dB	5	5	-Infinity	5
Io <sup>Note3</sup>		dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		-	AW	GN	AW	GN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.  Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over					ower spectral	
subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be fulfilled.  Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone						

# A.7.3.2.3.1.3 Test Requirements

system implementation

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

As observed with 0 dBi gain antenna at the centre of the quiet zonee

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test

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:

Note 5:

Note 6:

 $T_{RRC\_procedure\_delay}\!=110$  ms in the test.

 $T_{identify-NR} = 1760$  ms in the test.

 $T_{SI-NR} = 1280$  ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 10 \text{ ms in the test.}$ 

This gives a total of 3160 ms.

# A.7.4 Timing

# A.7.4.1 UE transmit timing

# A.7.4.1.1 NR UE Transmit Timing Test for FR2

## A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: 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.3.1	
BWchannel	MHz	1	100: N <sub>RB,c</sub> = 66	
Data RBs allocated		1	66	
Initial BWP Configuration		1		BWP.0.1 BWP.0.1
Dedicated BWP Configuration		1		BWP.1.1 BWP.1.1
TRS Configuration		1	TRS	.2.1 TDD
PDSCH/PDCCH TCI state		1	TCI	.State.2
DRx Cycle	ms	1	N/A	DRX.8 <sup>Note5</sup>
PDSCH Reference measurement channel		1	SR.:	3.3 TDD

RMSI CORESET Reference Channel		1	CR.3	3.2 TDD
Dedicated CORESET Reference Channel		1	CCR.	3.7 TDD
OCNG Patterns		1	(	)P.1
SSB Configuration		1		3.4 FR2
SMTC Configuration		1	SN	/ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1		120
EPRE ratio of PSS to SSS  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  EPRE ratio of PDCCH to PDCCH DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS to SSS  EPRE ratio of OCNG DMRS to SSS(Note 1)  EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	1	0	0
Propagation condition		1	A	WGN
SRS Config		1	SRSConf.1 <sup>Note6</sup>	SRSConf.2 <sup>Note6</sup>

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.7.4.1.1.1-3

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		Setup 1 according	to clause A.3.15.1
Assumption for UE beams <sup>Note</sup>		Fi	ne
Note1	dBm/15kHz <sup>Note4</sup>	-1	12
Note1 $N_{oc}$	dBm/SCS <sup>Note3</sup>	-1	00
$\hat{E}_s/N_{oc}$	dB		4
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-(	96
Ê s /I ot	dB		4
Io <sup>Note2</sup>	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 $_{N_{\infty}}$ to be fulfilled.
Note 2:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	Void
Note 4:	Equivalent power received by an antenna with 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:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.7.4.1.1.3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches N <sub>RB,c</sub>
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl2560, 4	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.7.4.1.1.4: Void

# A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC\_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.

- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within  $(N_{TA} + N_{TA\_offset}) \times T_c \pm T_e$  of the first detected path of DL SSB.
  - a. The  $N_{TA}$  offset value (in  $T_c$  units) is 13792
  - b. The  $T_e$  values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
240	+8*64T <sub>c</sub>	+4*64T <sub>c</sub>	

- 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 7.1.2.1-1 until the UE transmit timing offset is within ( $N_{TA} + N_{TA\_offset}$ )  $\times T_c \pm T_e$  respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX 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+1 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 <sub>A</sub> ) 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 <sub>A</sub> ) value during T2		39	For $120 \text{ kHz}$ SCS $N_{TA\_new} = N_{TA\_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1
Farameter	Onit	T1 T2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW <sub>channel</sub>	MHz	100: N <sub>RB,c</sub> = 66
BWP BW	MHz	100: N <sub>RB,c</sub> = 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
PDSCH/PDCCH TCI state		TCI.State.2
SMTC configuration		SMTC.1 FR2
SSB Configuration		SSB.3 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	4D	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 ra	tio of OCNG to OCNG DMRS (Note				
1)	·				
Propagat	tion condition	-	AWGN		
Note 1: OCNG shall be used such that the resources in the cell in this test 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:	lote 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 4: Note 5:	Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone				

Table A.7.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	Unit Test			
			T1	T2		
	arrival configuration		Setup 1 according	to clause A.3.15.1		
Assumpti	on for UE beams <sup>Note</sup>		Fine			
$N_{oc}$ Note1		dBm/15kHz <sup>Note4</sup>	-112			
$N_{_{OC}}$ Note1		dBm/SCS <sup>Note3</sup>	-1	03		
$\hat{E}_s/N_{oc}$		dB		4		
SS-RSRF	Note2	dBm/SCS Note4	-99			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB 4		4			
Io <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>	-68.5			
Note 1:		ner cells and noise sources no rriers and time and shall be n				
	for $N_{oc}$ to be fulfilled	d.				
Note 2:		els have been derived from one of the settable parameters them		nformation		
Note 3:		requirements are specified as		interference and		
Note 4:	Equivalent power red	ceived by an antenna with 0d		of the quiet zone		
Note 5:		Bi gain antenna at the centre				
Note 6:		oes of UE beam is given in B st system implementation	.2.1.3, and does not li	imit UE		

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment				
c-SRS	16	Francisco di abbad				
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=4	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.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. 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 addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, 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 Nun	nber			1		
Duplex mode		Config 1		TDD		
BW <sub>channel</sub>		Config 1		100: N <sub>RB,c</sub> = 66		
Data RBs allocat	ted	Config 1		24		
DL initial BWP co		Config 1		DLBWP.0.1		
DL dedicated BV		Config 1		DLBWP.1.1		
UL initial BWP co		Config 1		ULBWP.0.1		
UL dedicated BV		Config 1		ULBWP.1.1		
TDD Configuration		Config 1		TDDConf.3.1		
RMSI CORESET		Config 1		CR.3.1 TDD		
Dedicated CORE Channel	ESET Reference	Config 1		CCR.3.4 TDD		
SSB Configuration	on	Config 1		SSB.1 FR2		
SMTC Configura		Config 1		SMTC.1		
PDSCH/PDCCH spacing		Config 1		120 KHz		
PRACH Configu	ration	Config 1		Table A.3.8.3.1		
SSB index assig		Config 1		0,1		
OCNG paramete		, J		OP.5		
CP length				Normal		
Out of sync	DCI format			1-0		
transmission		rol OFDM symbols				
parameters	Aggregation lev		CCE	<u>2</u> 8		
•		etical PDCCH RE	dB	4		
		ge SSS RE energy				
	Ratio of hypothe	etical PDCCH DMRS ge SSS RE energy	dB	4		
	DMRS precoder			REG bundle size		
	REG bundle size			6		
DRX	TALO Dariale Siz	<u> </u>		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 r	eporting	Config 1		CSI-RS.3.1 TDD		
reportConfigType				periodic		
reportQuantity				cri-RI-PMI-CQI		
CSI reporting pe	riodicity		slot	40		
CSI reporting off			slot	4		
TCI states for PI				TCI.State.2		
CSI-RS for track		Config 1		TRS.2.1 TDD		
T1	<del>-</del>		S	0.2		
T2			S	9.68		
T3			S	9.68		
D1			S	9.64		
	ofigurations are as	signed to the LIF prior t				

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Paran	neter	Unit	Test 1						
				T1 T2 T3 T1 T2					
AoA setup	AoA setup			Setup 3 defined in A.3.15					
				AoA1			AoA2		
Assumption for UE beau	ams <sup>Note 5</sup>			Rough			Rough		
EPRE ratio of PDCCH	DMRS to SSS	dB		4			Not sent		
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							
EPRE ratio of PDSCH	to PDSCH DMRS	dB							
EPRE ratio of OCNG I	DMRS to SSS	dB							
EPRE ratio of OCNG t	EPRE ratio of OCNG to OCNG DMRS								
ssb-Index 0 SNR	Config 1	dB	2 <sup>Note 6</sup>	-6 <sup>Note 6</sup>	-15				
ssb-Index 1 SNR	Config 1			Not sent		2 <sup>Note 6</sup>	-15	-15	
$N_{oc}$	Config 1	dBm/		-92.1			-92.1		
		15kHz							
Time multiplexing of the				Define	d in Figu	re A.7.5.	1.1.1-2		
transmissions from ea	ch AoA								
Propagation condition				-A 30ns 7	-		-A 30ns 7	_	
	I be used such that a c	onstant to	otal transı	mitted pow	er spect	ral densit	y is achie	ved for	
all OFDM s	,								
5	contains PDCCH for UI					s part of C	DCNG.		
	correspond to the sign								
	The SNR values are specified for testing a UE which supports 2RX on at least one band. For								
	UE which supports 4R								
	about types of UE bea	m is give	n in B.2.1	.3 and doe	es not lin	nit UE imp	olementat	ion or	
,	implementation.								
Note 6: This value a	allows up to 1dB degra	dation fro	m applied	SNR to U	JE baseb	and			

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

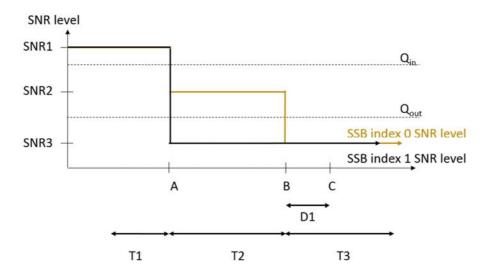


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

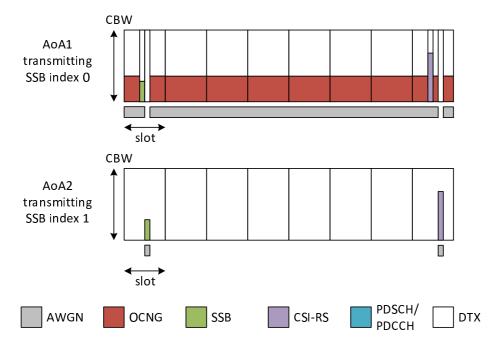


Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

# A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

#### A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.2.1-1. The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. 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

Paramete	r	Unit	Value		
			Test 1		
Anti-un DCnII			Call 4		
Active PCell			Cell 1		
RF Channel Number	0 0 - 4		1		
Duplex mode	Config 1		TDD		
BW <sub>channel</sub>	Config 1		100: N <sub>RB,c</sub> = 66		
Data RBs allocated	Config 1		24		
DL initial BWP configuration	Config 1		DLBWP.0.1		
DL dedicated BWP	Config 1		DLBWP.1.1		
configuration					
UL initial BWP configuration	Config 1		ULBWP.0.1		
UL dedicated BWP	Config 1		ULBWP.1.1		
configuration					
TDD Configuration	Config 1		TDDConf.3.1		
RMSI CORESET Reference	Config 1		CR.3.1 TDD		
Channel					
Dedicated CORESET	Config 1		CCR.3.1 TDD		
Reference Channel					
SSB Configuration	Config 1		SSB.1 FR2		
SMTC Configuration	Config 1		SMTC.3		
PDSCH/PDCCH subcarrier	Config 1		120 KHz		
spacing	, and the second				
PRACH Configuration	Config 1		Table A.3.8.3.1		
SSB index assigned as RLM	Config 1		0,1		
RS			,		
OCNG parameters	•		OP.5		
CP length			Normal		
DCI format			1-0		
Number of Co	ntrol OFDM symbols		2		

In sync	Aggregation level	CCE	4
transmission	Ratio of hypothetical PDCCH RE	dB	0
parameters	energy to average SSS RE energy	ub	O
paramotoro	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average SSS RE	ub	Ŭ
	energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average SSS RE energy		
	Ratio of hypothetical PDCCH	dB	4
	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	g		Enabled
T310 timer		ms	4000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CS	I reporting Config 1		CSI-RS.3.1 TDD
reportConfigTy	/pe		periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting p		slot	40
CSI reporting of		slot	4
	PDCCH/PDSCH		TCI.State.2
CSI-RS for trac	cking Config 1		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 of	configurations are assigned to the UE p	rior to the star	t of time period T1.

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

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	Unit	Unit Test 1									
		T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			•	•	Se	tup 3 defi	ned in A.	3.15	•		
				AoA1			AoA2				
Assumption for UE beams Note 5		Rough					Rough				
EPRE ratio of PDCCH DMRS to SSS	dB	0				Not sent					
EPRE ratio of PDCCH to PDCCH DMRS	dB			0							
EPRE ratio of PBCH DMRS to SSS	dB										
EPRE ratio of PBCH to PBCH DMRS	dB										
EPRE ratio of PSS to SSS	dB										
EPRE ratio of PDSCH DMRS to SSS	dB										

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 <sup>Note 6</sup>	-6 <sup>Note 6</sup>	-15	-15	-15					
ssb-Index 1 SNR	Config 1		Not sent				2 <sup>Note 6</sup>	-15	-15	-4.5	2 <sup>Note 6</sup>	
$N_{oc}$	Config 1	dBm/			-92.1					-92.1		
- 100		15kHz										
Time multiplexing of the downlink			Defined in Figure A.7.5.1.2.1-2									
transmissions from each AoA												
Propagation condition			TDL-A 30ns 75Hz TDL-A 30ns 75Hz					75Hz				

- Note 1: OCNG shall be used such that 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.
- Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

## Table A.7.5.1.2.1-4: Void

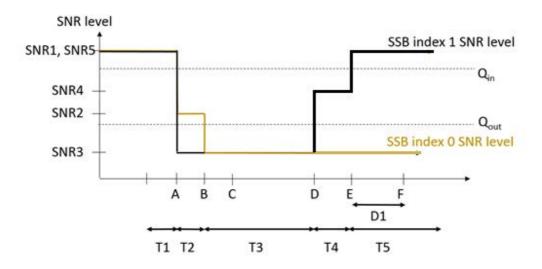


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

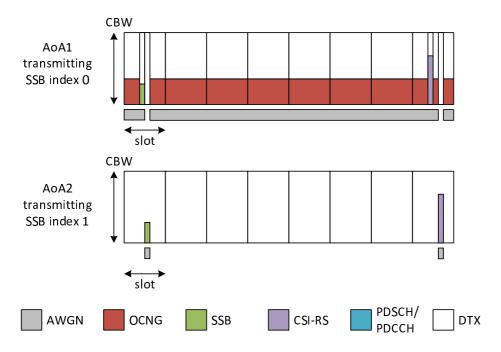


Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

### A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

#### A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description		
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz		

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Parameter		Unit	Value	
				Test 1
Active PCell	Active PCell			Cell 1
	RF Channel Number			1
Duplex mode		Config 1		TDD
BW <sub>channel</sub>		Config 1		100: N <sub>RB,c</sub> = 66
Data RBs alloc	ated	Config 1		66
DL initial BWP	configuration	Config 1		DLBWP.0.1
DL dedicated E		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
RMSI CORESI	ET Reference	Config 1		CR.3.1 TDD
Channel				
Dedicated COF	_	Config 1		CCR.3.4 TDD
Reference Cha				
SSB Configura		Config 1		SSB.1 FR2
SMTC Configu		Config 1		SMTC.1
PDSCH/PDCC	H subcarrier	Config 1		120 KHz
spacing				
PRACH Config		Config 1		Table A.3.8.3.1
SSB index assi RS	gned as RLM	Config 1		0,1
OCNG parame	ters			OP.1
CP length				Normal
Out of sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE age SSS RE energy	dB	4
		netical PDCCH	dB	4
		to average SSS RE	ub	7
	energy	to arolago ooo re		
	DMRS precod	er granularity		REG bundle size
	REG bundle si			6
DRX Configura				DRX.3
Gap pattern ID				N.A.
Layer 3 filtering	1			Enabled
T310 timer		ms	0	
T311 timer			ms	1000
N310			1	
N311			1	
CSI-RS for CSI reporting Config 1			CSI-RS.3.1 TDD	
reportConfigType			periodic	
reportQuantity			cri-RI-PMI-CQI	
CSI reporting periodicity			slot	40
CSI reporting of			slot	4
	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

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

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

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1	
			T1	T2	Т3
AoA setup			Setup 1 defined in A.3.15		
Assumption for UE beam	ns Note 5			Rough	
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	BCH DMRS	dB			
EPRE ratio of PSS to SS	S	dB			
EPRE ratio of PDSCH D	MRS to SSS	dB		0	
EPRE ratio of PDSCH to	PDSCH DMRS	dB			
EPRE ratio of OCNG DM	IRS to SSS	dB			
EPRE ratio of OCNG to	OCNG DMRS	dB			
ssb-Index 0 SNR	Config 1	dB	2 <sup>Note 6</sup>	-6 <sup>Note 6</sup>	-15
ssb-Index 1 SNR	Config 1		2 <sup>Note 6</sup>	-15	-15
N <sub>oc</sub>	Config 1	dBm/15K Hz	-104.7dBm		
Propagation condition			Т	DL-A 30ns 75Hz	7
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant to			nstant 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.

Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation Note 5: or test system implementation.

Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

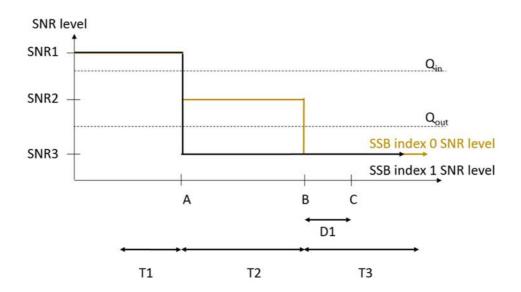


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

#### A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

### A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration Description
---------------------------

1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Parameter		Unit	Value	
A (' DO !!				Test 1
Active PCell				Cell 1
RF Channel Number		Confin 4		1
Duplex mode		Config 1		TDD
BW <sub>channel</sub>	-4d	Config 1		100: N <sub>RB,c</sub> = 66
Data RBs alloc		Config 1		66
DL initial BWP DL dedicated B		Config 1		DLBWP.0.1 DLBWP.1.1
configuration	SVVP	Config 1		DLBWP.1.1
UL initial BWP	configuration	Config 1	+	ULBWP.0.1
UL dedicated E		Config 1		ULBWP.1.1
configuration	7 7 7 1	Comig		OLDWI .I.I
TDD Configura	tion	Config 1		TDDConf.3.1
RMSI CORESE	T Reference	Config 1		CR.3.1 TDD
Channel	_ T TOO CHOO	Coming 1		GIX.6.1 1BB
Dedicated COF	RESET	Config 1		CCR.3.1 TDD
Reference Cha				001.110111122
SSB Configura		Config 1		SSB.1 FR2
SMTC Configu		Config 1		SMTC.3
PDSCH/PDCC		Config 1		120 KHz
spacing				0
PRACH Config	uration	Config 1		Table A.3.8.3.1
SSB index assi		Config 1		0,1
RS	<b>J</b>			-,
OCNG parame	ters			OP.1
CP length				Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le	vel	CCE	4
		etical PDCCH RE	dB	0
	energy to avera	age SSS RE energy		_
	Ratio of hypoth		dB	0
		to average SSS RE		
	energy	ar aranularitu		DEC bundle size
	DMRS precode REG bundle si	er granularity		REG bundle size
Out of owns	DCI format	<u>ze</u>		6
Out of sync transmission		ntrol OFDM symbols		1-0 2
parameters	Aggregation le		CCE	
parameters		netical PDCCH RE	dB	<u>8</u> 4
		age SSS RE energy	uБ	4
	Ratio of hypoth		dB	4
		to average SSS RE	ub l	<b>-</b>
energy		to avolugo oco re		
	DMRS precode			REG bundle size
REG bundle size			6	
DRX Configura				DRX.11
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311			1	

CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodicity		slot	40
CSI reporting offset		slot	4
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

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
AoA setup				Setup 1	defined	in A.3.1	15
Assumption for UE be	eams Note 5				Rough	1	
EPRE ratio of PDCCH	H DMRS to SSS	dB			0		
EPRE ratio of PDCCH	to PDCCH DMRS	dB			0		
EPRE ratio of PBCH I	DMRS to SSS	dB					
EPRE ratio of PBCH t	to PBCH DMRS	dB					
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSCH	I 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 <sup>Note</sup>	-	-15	-4.5	2 <sup>Note 6</sup>
			6	6 <sup>Note</sup>			
				6			
ssb-Index 1 SNR	Config 1		2 <sup>Note</sup>	-15	-15	-15	-15
			6				
$N_{oc}$	Config 1	dBm/1 5KHz	-104.7dBm				
Propagation condition	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.							

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.

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.

Information about types of UE beam is given in B.2.1.3 and does not limit UE Note 5: implementation or test system implementation.

This value allows up to 1dB degradation from applied SNR to UE baseband Note 6:

Table A.7.5.1.4.1-4: Void
Table A.7.5.1.4.1-5: Void

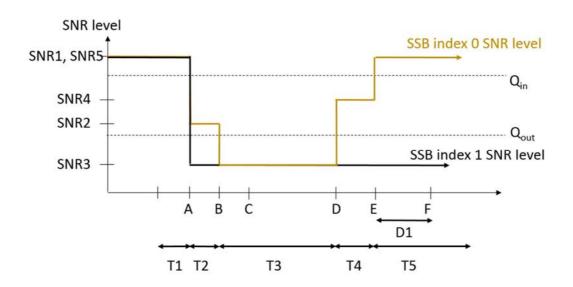


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

#### A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

#### A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description

1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth
---	---

Table A.7.5.1.5.1-2: General test parameters for FR2 PCeII 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
BW <sub>channel</sub>	Config 1		100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1		24
BW <sub>occupied</sub>	Config 1		24
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.4
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.4 TDD
CORESET			CCR.3.6 TDD
Reference Channel			
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.5
CP length			Normal
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		DEC hardle stee
	DMRS precoder granularity		REG bundle size
DDV	REG bundle size		6 OFF
DRX			
Gap pattern ID			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1

CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD	
reporting	_			
reportConfigType			periodic	
reportQuantity			cri-RI-PMI-CQI	
CSI reporting periodic	city	slot	40	
CSI reporting offset		slot	4	
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 starts.				

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Para	Unit	Test 1						
			T1	T2	T3	T1	T2	Т3
AoA setup				Set	up 3 defii	ned in A.3	3.15	
				AoA1			AoA2	
Assumption for UE be	ams Note 10			Rough			Rough	
EPRE ratio of PDCCH	I DMRS to SSS	dB		4				
EPRE ratio of PDCCH	to PDCCH DMRS	dB						
EPRE ratio of PBCH	DMRS to SSS	dB						
EPRE ratio of PBCH	o PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB						
EPRE ratio of PDSCH	I DMRS to SSS	dB		0			Not sent	
EPRE ratio of PDSCH	I to PDSCH DMRS	dB						
EPRE ratio of OCNG	DMRS to SSS	dB						
EPRE ratio of OCNG	to OCNG DMRS	dB						
SNR on RLM-RS1	Config 1	dB	2 <sup>Note 11</sup>	-6 <sup>Note</sup>	-15			
SNR on RLM-RS2	Config 1	dB	Not sent		2 <sup>Note 11</sup>	-15	-15	
$N_{oc}$	Config 1	dBm/ 15kHz	-92.1		-92.1 -92.1			
Propagation condition	pagation condition			TDL-C 300ns 100Hz TDL-C 300r			C 300ns 1	00Hz

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 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.
- Note 10: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

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			
	rieiu	Value			
	gapOffset	0			
Note 1:	RLM RS is partially overlapped with				
	measurement gap				

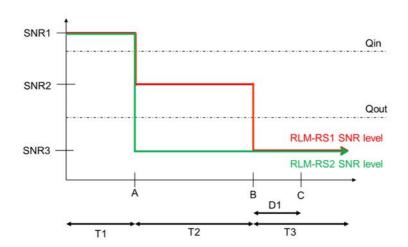


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

#### A.7.5.1.5.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C ( $D_1$  second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

#### A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
BW <sub>channel</sub>	Config 1		100: N <sub>RB,c</sub> = 66
Data RBs allocated	Config 1		24
BW <sub>occupied</sub>	Config 1		24
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.4
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.1 TDD
CORESET			CCR.3.3 TDD
Reference Channel			
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.5
CP length	T		Normal
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	<u> </u>	
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		DEC bygalla sign
	DMRS precoder granularity		REG bundle size
to some two transitions	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols Aggregation level	CCE	4
	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 for CSI reporting	Config 1		CSI-RS.3.1 TDD		
reportConfigType			periodic		
reportQuantity			cri-RI-PMI-CQI		
CSI reporting periodic	ity	slot	40		
CSI reporting offset		slot	4		
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 sta	arts.			

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	T1	T2	T3	T4	T5
AoA setup	etup Setup 3 defined in A.3.15										
				AoA1					AoA2		
Assumption for UE beams Note 10				Rough					Rough		
EPRE ratio of PDCCH DMRS to SSS	dB			0							
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								Not sent		
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										

SNR on RLM-RS1	Config 1	dB	2 <sup>Note</sup> 11	-6 <sup>Note</sup>	-15	-15	-15					
SNR on RLM-RS2	Config 1	dB		Not sent			2 <sup>Note</sup> 11	-15	-15	-4.5	2 <sup>Note</sup> 11	
N <sub>oc</sub>	Config 1	dBm/ 15KHz	-92.1					-92.1				
Propagation	condition			TDL-C 300ns 100Hz			TDL-(	C 300ns	100Hz			

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, 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.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

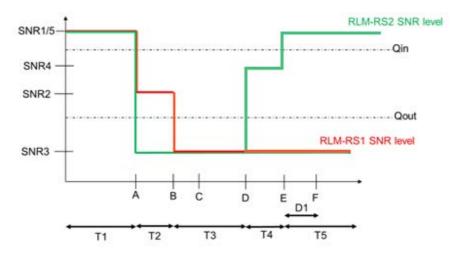


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

## A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

#### A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description			
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration	_		
DL dedicated BWP	Config 1		DLBWP.1.1
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.4 TDD
CORESET			CCR.3.6 TDD
Reference Channel			
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
	DCI format		1-0

Out of sync transmission	Number of Control OFDM		2		
parameters	symbols Aggregation level	CCE	8		
parameters	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 CSI	Config 1		CSI-RS.3.1 TDD		
reporting			n o vio di o		
reportConfigType reportQuantity			periodic cri-RI-PMI-CQI		
CSI reporting periodic	ity	slot	40		
CSI reporting offset	ny .	slot	4		
T1		S	0.2		
T2		S	1.28		
T3		S	1.28		
D1		S	1.24		
	PDCCH is not transmitted after T1 sta	_			

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	Т3		
AoA setup	dB	Setup 1 defined in A.3.15				
Assumption for UE beams Note 10			Rough			
EPRE ratio of PDCCH DMRS to SSS	dB		4			
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					
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					
SNR on Config 1 RLM-RS1	dB	2 <sup>Note 11</sup>	-6 <sup>Note 11</sup>	-15		

implementation.

SNR on RLM-RS2	Config 1	dB	2 <sup>Note 11</sup> -15 -15				
$N_{oc}$	Config 1	dBm/15KHz	-104.7				
Propagati	ion condition		TDL-C 300ns 100Hz				
Note 1:	OCNG shall be used su	ch that the resources	in Cell 1 are fully alloc	cated and a constant t	otal transmitted		
	power spectral density is						
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 fi	layer 3 filtering related parameters are configured prior to the start of time period T1.					
Note 6:	The signal contains PDC	CCH for UEs other than the device under test as part of OCNG.					
Note 7:	SNR levels correspond to	o 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:		ecified for testing a UE which supports 2RX on at least one band. For testing of a UE					
			ds, the SNR during T3 is specified in section A.3.6.1.				
Note 10:	Information about types	of UE beam is given i	n in B.2.1.3 and does not limit UE implementation or test system				

This value allows up to 1dB degradation from applied SNR to UE baseband

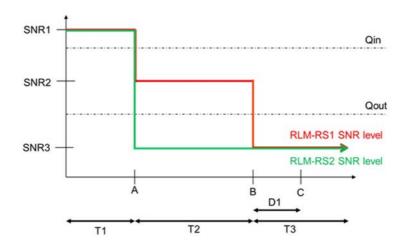


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

#### A.7.5.1.7.2 Test Requirements

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

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C ( $D_1$  secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

#### A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 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 Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for F	PDCCH#1/PDSCH		TCI.State.2
TCI configuration for PDCCH#2			TCI.State.3
OCNG parameters			OP.1
CP length			Normal
	DCI format		1-0

Out of sync	Number of Control OFDM		2
transmission	symbols		2
parameters	Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE	uБ	4
	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 sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
paramotoro	symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE	45	Ğ
	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			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodic	ity	slot	40
CSI reporting offset		slot	4
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 sta	arts.	

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
AoA setup	dB		Setup	1 defined in A	A.3.15	
Assumption for UE beams Note 10				Rough		
EPRE ratio of PDCCH DMRS to SSS	dB	0				
EPRE ratio of PDCCH to PDCCH DMRS	dB					
EPRE ratio of PBCH DMRS to SSS	dB			0		
EPRE ratio of PBCH to PBCH DMRS	dB			0		

EPRE ratio of	PSS to SSS	dB					
EPRE ratio of PDSCH DMRS to		dB					
SSS EPRE ratio of PDSCH to PDSCH		dB	_				
DMRS EPRE ratio of SSS	OCNG DMRS to	dB	_				
	OCNG to OCNG	dB	<del>-</del>				
SNR on RLM-RS1	Config 1	dB	2 <sup>Note 11</sup>	-6 <sup>Note 11</sup>	-15	-4.5	2 <sup>Note 11</sup>
SNR on RLM-RS2	Config 1	dB	2 <sup>Note 11</sup>	-15	-15	-15	-15
N <sub>oc</sub> Config 1		dBm/15KHz			-104.7		
Propagation c	ondition			TDL	-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 1		
	Value			
	gapOffset	0		
Note 1:	1: RLM RS is partially overlapped with			
	measurement gap			

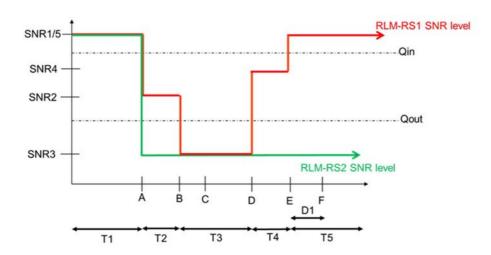


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

#### A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

### A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

#### A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	

T1	S	1	5	During T1 the UE is required to correctly
				transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Cell 1		
AoA setup		1	Setup 3 defined in A.3.15.3		
			AoA1	AoA2	
Assumption for UE beams Note 1			Rough	Rough	
TDD configuration		1	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	1	100: N <sub>F</sub>	RB,c = 66	
Data RBs allocated		1	2	4	
PDSCH Reference		1	SR.3.2 TDD	Not sent	
measurement					
channel					
RMSI CORESET RMC configuration		1	CR.3.1 TDD	Not sent	
Dedicated CORESET RMC configuration		1	CCR.3.2 TDD	Not sent	
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.5 defined in A.3.2.1	Not sent	
Initial DL BWP		1	DLBWP.0.1		
configuration			_		
Initial UL BWP configuration		1	ULBWP.0.1		
RLM-RS		1	SSB with index 0	SSB with index 1	
$N_{oc}$	dBm/15kHz	1	-92.1	-92.1	
$N_{oc}$ Note2	dBm/SCS	1	-83.1	-83.1	
$\hat{E}_s/N_{oc}$	dB	1	2	2	
Ê <sub>s</sub> /I <sub>ot BB</sub> Note 4	dB	1	1	1	
SSB_RP Note3	dBm/SCS	1	-81.1	-81.1	
lo	dBm/95.04 MHz	1	-54.35	-54.35	
Time multiplexing transmissions f		1		re A.7.5.1.9.1-1	
Propagation Condition		1	AWGN	AWGN	

Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

or  $N_{oc}$  to be fulfilled.

Note 3: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/Iot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

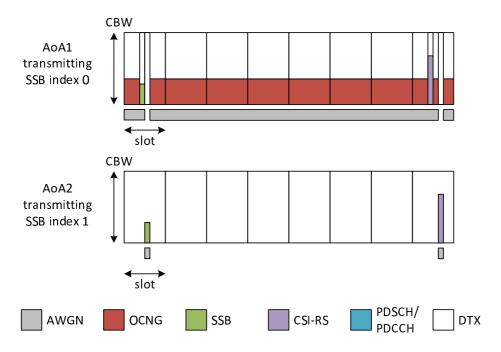


Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

### 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 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.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Paramete	er	Unit	Cell1	Cell2		
Frequency Range			F	R2		
Duplex mode				DD		
TDD configuration			TDDC	Conf.3.1		
BW <sub>channel</sub>			100 MHz:	$N_{RB,c} = 66$		
Data RBs allocated				66		
Initial DL BWP			DLBWF	P.0.2 <sup>Note4</sup>		
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.3.1 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						
EPRE ratio of PBCH D						
EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH						
		dB	0	0		
DMRS	DMD0 t-					
EPRE ratio of PDSCH	DIVIRS to					
SSS	+- DD0011					
EPRE ratio of PDSCH	to PDSCH					

defined in clause 12 of of TS 38.213 [3].

EPRE rat	io of OCNG DMRS to					
SSS(Note	e 1)					
EPRE rat	io of OCNG to OCNG					
DMRS (N	lote 1)					
Time offs	Time offset to Cell1 Note 3		-	3		
Propagat	ion Condition		AWGN			
Note 1:	OCNG shall be used such to spectral density is achieved		Is are fully allocated and a const M symbols.	tant total transmitted power		
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 D	L BWP is lir	nked with an UL BWP. DLBWP.0	0.2 is linked with ULBWP.0.2		

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 configuration			Setup1 according	
Assumption for UE beams Note 6			to table A.3.15.1	
			Rough	Rough
	NR_TDD_FR2_A			
3.7	NR_TDD_FR2_B			
$N_{oc}$ Note1	NR_TDD_FR2_F	dBm/15kHz	-104 7	-1047
	NR_TDD_FR2_G		104.7	
	NR_TDD_FR2_T			Setup 1according
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			-95.7
	NR_TDD_FR2_B			
$N_{oc}$ Note1	NR_TDD_FR2_F	dBm/SCS	-95.7	-95.7
	NR_TDD_FR2_G	dbiii/303		
	NR_TDD_FR2_T	DD_FR2_Y		
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A		-88 7	
	NR_TDD_FR2_B			table A.3.15.1         to table A.3.15.1           Rough         Rough           -104.7         -104.7           -95.7         -95.7           -88.7         -88.7           7         7           7         7           7         7
SS-RSRPNote2	NR_TDD_FR2_F	dBm/120KH		
00-NON	NR_TDD_FR2_G	z Note3	-00.7	
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
$\hat{E}_s/N_{oc}$		dB	7	7
$\hat{E}_{_{s}}/I_{_{ot}}$		dB	7	7
	NR_TDD_FR2_A			
	NR_TDD_FR2_B	1		50.00
IoNote2	NR_TDD_FR2_F	dBm/95.04	E0 00	
10'10102	NR_TDD_FR2_G	F dBm/95.04 G MHz Note4 -58.92 -58.92		
	NR_TDD_FR2_G MHz NOTES			
	NR TDD FR2 Y	7		

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 6:	Information about types of UE beams is given in B.2.1.3 and does not limit UE	
	implementation or test system implementation.	

#### A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. The interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

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	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

### A.7.5.3 SCell Activation and Deactivation Delay

### A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

### A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment

RF Channel Number		Two NR radio channels are used for this
	1,2	test, cell 1 and cell2 use RF channel 1 and
		2, respectively.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter <sup>Note 5</sup>	Unit	Cell 1			Cell 2			
Parameter	Onit	T1	T2	T3	T1	T2	T3	
SSB ARFCN			freq1			freq2		
Duplex mode		TDD						
TDD configuration				TDDC	onf.3.1			
Downlink initial BWP Configuration					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			
TRS configuration				TRS.2	2.1 TDD			
TCI state				TCI.S	State.0			
BW <sub>channel</sub>	MHz			100: N	RB,c = 66			
Data RBs allocated			66			66		
PDSCH Reference measurement channel			SR.3.1 TD	D		-		
RMSI CORESET Parameters		(	CR.3.1 TD	D		-		
Dedicated CORESET Parameters		C	CR.3.1 TE	DD		-		
OCNG Patterns				0	OP.1			
SSB Configuration		SSB.1 FR2						
SMTC Configuration		SMTC.1						
CSI-RS configuration for CSI reporting				CSI-RS	.3.1 TDD			
reportConfigType			periodic			N/A		
reportQuantity		C	ri-RI-PMI-C	CQI		N/A		
CSI reporting periodicity	slot		40			N/A		
CSI reporting offset	slot		4			N/A		
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				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					/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: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

Parameter	Unit	Cell 1			Cell 2		
	Offic	T1	T2	T3	T1	T2	Т3
Angle of arrival configuration		Setup 1 according to table A.3.15.1		to table	Setup 1 according to table A.3.15.1		to table
Assumption for UE beams Note 7		Rough Rough					
Note1	dBm/15kHz <sup>N</sup>	-104.7		-104.7			

Note1	dBm/SCS <sup>Note</sup>	-95.7	-95.7
$\hat{E}_s/N_{oc}$	dB	7	7
SSB_RPNote2	dBm/SCS Note4	-88.7	-88.7
$\hat{E}_{s}/I_{ot}$	dB	7	7
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup>	-58.92	-58.92

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 to be fulfilled.

Note 2: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void

Note 7: Implementation about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test

system implementation.

#### A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except  $T_{activation\_time}$  will be replaced with the value  $T_{FirstSSB} + 5ms$  as defined in clause 8.3.

# A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

#### A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are 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 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) 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.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot  $m+T_{L1-RSRP}$ . In the next DL slot after slot  $m+T_{L1-RSRP}$ , the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

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 test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell 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.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 on	Note: The UE is only required to pass in one of the supported test configurations				

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

Darame	eter <sup>Note 5</sup>	Unit	Cell 1			Cell 2			
	etel	Offic	T1	T2	T3	T1	T2	Т3	
SSB ARFCN				Freq1			Freq2		
Duplex mode	Config 1			FDD		TDD			
	Config 2,3				TDD	)D			
	Config 1		1	Not Applicable					
TDD configuration	Config 2			TDDConf.1.1			TDDConf.3	.1	
	Config 3			TDDConf.2.1		1			
Downlink initial BWP Configuration	Config 1,2,3				DLBWP	.0.1			
Downlink dedicated BWP Configuration	Config 1,2,3				DLBWP	.1.1			
Uplink initial BWP configuration	Config 1,2,3				ULBWP	.0.1			
Uplink dedicated BWP configuration	Config 1,2,3				ULBWP	.1.1			
TRS configuration	Config 1,2,3		N/A			TRS.2.1 TDD			
TCI state	Config 1,2,3				TCI.Sta	te.0			
BW <sub>channel</sub>	Config 1,2	MHz		10: N <sub>RB,c</sub> = 52	2	100: N <sub>RB,c</sub> = 66			
	Config 3	IVITZ	4	40: N <sub>RB,c</sub> = 10	6				
Data RBs allocated	Config 1,2		52	66	52	66	52	66	
	Config 3		106		106		106		
PDSCH Reference	Config 1			SR.1.1 FDD					
measurement	Config 2			SR.1.1 TDD		] -			
channel	Config 3			SR.2.1 TDD					
DMOLOODEOET	Config 1			CR.1.1 FDD					
RMSI CORESET	Config 2			CR.1.1 TDD			-		
Parameters	Config 3			CR.2.1 TDD					
Dedicated	Config 1			CCR.1.1 FDD	)				
CORESET	Config 2			CCR.1.1 TDD	)		-		
Parameters	Config 3			CCR.2.1 TDD					
OCNG Patterns					OP.				
000('	Config 1,2			SSB.1 FR1			000 0 50	`	
SSB configuration	Config 3			SSB.2 FR1			SSB.3 FR	2	
CSI-RS configuration for CSI reporting	Config 1~3		N/A		N/A	CSI- RS.3.1 TDD Note 6	CSI- RS.3.1 TDD		
reportConfigType for CSI reporting			periodic			N/A			
reportConfigType for L1-RSRP				periodic		N/A			

reportQuantity for			cri-RI-PMI-CQI	N/A		
CSI reporting						
reportQuantity for			ssb-Index-RSRP	N/A		
L1-RSRP						
CSI reporting	Config 1,2	slot	5	N/A		
periodicity	Config 3	3101	10	14// (		
L1-RSRP reporting	Config 1,2	slot	5	N/A		
periodicity Note 7	Config 3	SIOL	10	IN/A		
CCI reporting offeet	Config 1,2	slot	2	N/A		
CSI reporting offset	Config 3	SIOL	4	IN/A		
L1-RSRP reporting	Config 1,2	slot	2	NI/A		
offset			4	N/A		
SMTC configuration			SMTC.1			
EPRE ratio of PSS to	SSS					
EPRE ratio of PBCH	DMRS to SSS	ĺ				
EPRE ratio of PBCH	to PBCH_DMRS		_			
EPRE ratio of PDCCI	H DMRS to SSS					
EPRE ratio of PDCCI	_	ı.				
EPRE ratio of PDSCI	H DMRS to SSS	dB	0			
EPRE ratio of PDSCI	_					
EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note						
1						
Duana nation and 200 a	B 194		N/A	AVA/CNI		
Propagation condition	าร		Link only, see clause A.3.7A	AWGN		
Note 1: OCNC ob	all ha waad awab that ha	مع مالم معم	fully allocated and a constant total	al transmitted navver encetral		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2.

Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T<sub>L1-RSRP</sub> during T2.

Note 7: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.

Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

Poro	meter	Unit		Cell 1		Cell 2				
Fala	meter	Onit	T1	T2	T3	T1	T2	Т3		
Angle of arrival configuration			N/A		According to clause A.3.15.1					
Assumption for UE b	eams <sup>Note 7</sup>			N/A			Rough			
$N_{oc}$ Note 1	Config 1,2,3	dBm/15kHz	Link only, see clause			-104.7				
$N_{oc}$ Note 1	Config 1,2,3	dBm/SCS				-95.7				
$\hat{E}_s/N_{oc}$	Config 1,2,3	dB				-∞	7	7		
È , /1 "	Config 1,2,3	dB	A.3.7A		-∞	7	7			
SSB_RPNote 2, Note 4	Config 1,2,3	dBm/SCS				-∞	-88.7	-88.7		
Io <sup>Note 2, Note 4</sup>	Config 1,2,3	dBm/95.04 MHz				-66.68	-58.92	-58.92		

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: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOIE 3.	Void
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void

Void

Note 2:

Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation.

### A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot  $(m+T_{L1-RSRP})$ , where  $T_{L1-RSRP}$  is no larger than

$$3ms + T_{FirstSSB\_MAX} + 15*T_{SMTC\_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}}$$

as defined in clause 8.3.2. For this test case,  $T_{FirstSSB\_MAX} = T_{SMTC\_MAX} = T_{rs} = 20ms$ ;  $T_{L1-RSRP, measure} = 160ms$  and  $T_{L1-RSRP, report} = 5ms$ , which allows  $T_{L1-RSRP}$  680 ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot  $m + \frac{T_{HARQ} + T_{activtion,time} + T_{CSI\_Reporting}}{NR \, slot \, length}$ , where

- T<sub>HARQ</sub> is defined in Table A.5.5.3.1.1-2
- $-T_{activation\_time} = 3ms + T_{FirstSSB\_MAX} + 15*T_{SMTC\_MAX} + 8*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report} + max \left\{ (T_{HARQ} + T_{uncertainty\_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty\_RRC} + T_{RRC\_delay}) \right\}, which allows 710 ms$
- T<sub>CSI\_Reporting</sub> = 10ms
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot  $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ , as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot  $m+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$  to  $m+1+\frac{T_{\text{HARQ}}+3\,\text{ms}+T_{\text{X}}}{\text{NR slot length}}$ , as defined in clause 8.3, where  $T_{\text{X}}$ =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot  $n + 1 + \frac{T_{HARQ}}{NR \, slot \, length}$  to  $n + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$ , as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

### A.7.5.4 Void

# 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.7.5.5.1.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Configuration		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

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1-2		Cell 1	
RF Channel Number	1-2		1	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW <sub>channel</sub>	1-2		100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	
	2		SR.3.3 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	
	2		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	
	2		CCR.3.7 TDD	
OCNG parameters	1-2		OP.1	

CP length PDSCH/PDCCH TCI str CSI-RS for tracking SSB Configuration SMTC Configuration PRACH Configuration	ate	1-2 1-2 1-2		Normal TCI.State.0	
CSI-RS for tracking SSB Configuration SMTC Configuration	ate			TCLState 0	
SSB Configuration SMTC Configuration					
SMTC Configuration				TRS.2.1 TDD	
		1		SSB.1 FR2	
		2		SSB.2 FR2	
PRACH Configuration		1-2		SMTC.3	
PRACH Configuration		1-2		FR2 PRACH	A.3.8.3.2
DRX configuration		1-2		configuration 2 OFF	
SSB index assigned as BFD RS (q <sub>0</sub> )		1-2		0	
		1-2		1	
SSB index assigned as				-	
SSB index assigned as		1-2		0,1	
	DCI format	1-2		1-0	
	Number of Control	1-2		2	
	OFDM symbols				
	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1-2	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	
	DMRS precoder granularity	1-2		REG bundle size	
	REG bundle size			6	
		1-2			
Gap pattern ID		1-2		gp0	
gapOffset		1-2	ms	0	
rlmInSyncOutOfSyncThreshold		1-2		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1	dD/CCC	-95	Threshold used for
		2	dBm/SCS	-92	Qin_LR_SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMa	axCount	1-2		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionT		1-2		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for	or CSI reporting	1-2		CSI-RS.3.1 TDD	
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodicity	v	1-2	slot	40	
CSI reporting offset	,	1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2	1110	2	
T1		1-2	S	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-2	S	2.61	
T3		1-2	S	1.64	
T4		1-2	S	0	
T5		1-2	S	1.01	
				0.97	
D1		1-2	S		

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramet	er	Unit			Test 1		
			T1	T2	Т3	T4	T5
AoA setup				Setup	1 defined in	n A.3.15	
Assumption for UE bean	ns Note 10				Rough		
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB	]				
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					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DN	IRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q <sub>0</sub>	Config 1-2	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
M	Config 1,2	dBm/120			-104.7		
$N_{oc}$		KHz					
Propagation condition			TDL-A 30ns 75Hz				
Note 1: OCNG shall b	e used such that th	ne resources	in Cell 1 a	re fully alloc	cated and a	constant t	otal
transmitted power spectral density is achieved for all OFDM symbols.							
Note 2: The uplink res	ources for CSI rep	orting are ass	signed to t	he UE prior	to the star	t of time pe	riod T1.
Note 3: NZP CSLRS resource set configuration for CSI reporting are assigned to the LIE prior to the start							

- 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
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.1.1-4: Void

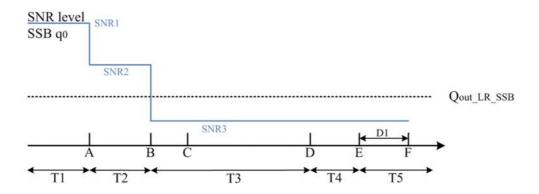


Figure A.7.5.5.1.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

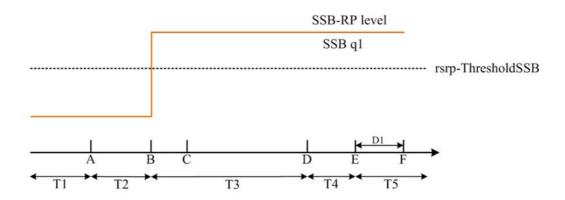


Figure A.7.5.5.1.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

## A.7.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = 960 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

#### A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set  $q_0$  configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set  $q_1$ . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set  $q_0$  in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-2 shows the variation of the downlink L1-RSRP 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 5 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

Configuration		Description			
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
Note:	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	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1-2		Cell 1	
RF Channel Number	1-2		1	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW <sub>channel</sub>	1-2		100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	
	2		SR.3.3 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	
	2		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	
	2		CCR.3.7 TDD	
OCNG parameters	1-2	•	OP.1	

CP length		1-2		Normal	
PDSCH/PDCCH TCI state		1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
gg		2	1	SSB.2 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration				FR2 PRACH	
- · <del> · · · · g - · · · · · ·</del>		1-2		configuration 2	A.3.8.3.2
DRX configuration		1-2		DRX.3	A.3.3.3
SSB index assigned as BFD RS (q <sub>0</sub> )		1-2		0	7
SSB index assigned as CBD RS (q <sub>1</sub> )		1-2		1	
SSB index assigned as RLM RS		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control			_	
transmission	OFDM symbols	1-2		2	
parameters	Aggregation level	1-2	CCE	8	
paramotoro	Ratio of hypothetical	1-2	COL	0	
	PDCCH RE energy to average SSS RE energy	1-2	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	
	DMRS precoder granularity	1-2		REG bundle size	
	REG bundle size	1-2		6	
Gap pattern ID		1-2		N/A	
rlmlnSyncOutOfSyncThreshold		1-2		absent	Value 0 is applied (Table 8.1.1-1).
rsrp-ThresholdSSB		1 2	dBm/SCS	-95	Threshold used fo
				-92	Q <sub>in_LR_</sub> SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount		1-2		n1	see TS 38.321 [7] clause 5.17
beamFailureDetectionTimer		1-2		pbfd4	see TS 38.321 [7] clause 5.17
CSI-RS configuration for CSI reporting		1-2		CSI-RS.3.1 TDD	
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodicity		1-2	slot	40	
CSI reporting offset		1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2		2	
T1		1-2	s	1	The UE shall be fully synchronized to cell during T1
T2		1-2	s	3.37	<u> </u>
T3		1-2	s	2.8	
T4		1-2	s	0	
14					
T5		1-2	S	0.61	

Note 2: UE-specific PDCCH is not transmitted after 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

Paramete	r	Unit	Test 1				
			T1	T2	Т3	T4	T5
AoA setup			Setup 1	defined ir	A.3.15		
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DM	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S 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					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_SSB of set q <sub>0</sub>	Config 1,2	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1	dBm/SCS	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2		-101.5	-101.5	-81.5	-81.5	-81.5
$N_{oc}$	Config 1-2	dBm/120			-104.7		
¹ voc		KHz					
Propagation condition				A 30ns 7			
	used such that th					constant to	otal

- 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: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 6:
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 Note 8: respectively in figure A.7.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or Note 10: test system implementation.
- This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.2.1-4: Void

#### Table A.7.5.5.2.1-5: Void

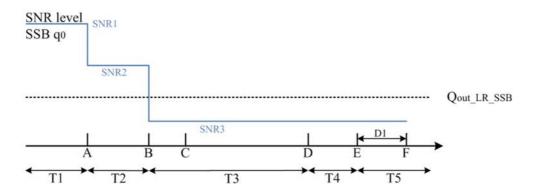


Figure A.7.5.5.2.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in DRX mode

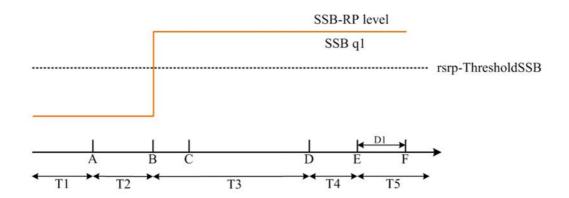


Figure A.7.5.5.2.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in DRX mode

### A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = 560 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

#### A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q<sub>0</sub> configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q<sub>1</sub>. 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.7.5.5.3.1-2 shows the variation of the downlink L1-RSRP 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 5 ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1		Cell 1	
RF Channel Number	1		1	
Duplex mode	1		TDD	
TDD Configuration	1		TDDConf.3.1	
BW <sub>channel</sub>	1		100: N <sub>RB,c</sub> = 66	
Data RBs allocated	1		66	
PDSCH/PDCCH subcarrier spacing	1	kHz	120	
DL initial BWP configuration	1		DLBWP.0.1	
DL dedicated BWP configuration	1		DLBWP.1.1	
UL initial BWP configuration	1		ULBWP.0.1	
UL dedicated BWP configuration	1		ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	
OCNG parameters	1		OP.1	
CP length	1		Normal	
PDSCH/PDCCH TCI state	1		TCI.State.0	
CSI-RS for tracking	1		TRS.2.1 TDD	
SSB Configuration	1		SSB.1 FR2	
SMTC Configuration	1		SMTC.3	
PRACH Configuration	1		FR2 PRACH	A.3.8.3.4
	'		configuration 4	A.J.O.J.4
DRX configuration	1		OFF	

CSI-RS configuration f	for BFD/CBD/RLM	1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS index assigne	d as BFD RS (g <sub>0</sub> )	1		0	
CSI-RS index assigne		1		1	
CSI-RS index assigne		1		0,1	
Beam failure	DCI format	1		1-0	
detection	Number of Control				
transmission	OFDM symbols	1		2	
parameters	Aggregation level	1	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1	dB	0	
	DMRS precoder granularity	1		REG bundle size	
	REG bundle size	1		6	
Gap pattern ID		1		N/A	
rlmlnSyncOutOfSyncT	hreshold	1		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1	dBm/SCS	-95	Threshold used for Qin_LR_SSB
powerControlOffsetSS		1		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceN	/laxCount	1		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection		1		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration f	for CSI reporting	1		CSI-RS.3.1 TDD	A.3.14.2
reportConfigType		1		periodic	
reportQuantity		1		cri-RI-PMI-CQI	
CSI reporting periodici	ity	1	slot	40	
CSI reporting offset		1	slot	4	
T310		1	ms	1000	
N310		1		2	
T1		1	s	1	The UE shall be fully synchronized to cell 1 during T1
T2		1	s	1.17	
T3		1	S	0.9	
T4		1	S	0	
T5		1	S	0.31	
D1		1	S	0.27	
Note 1: UE-specific	PDCCH is not transmitted a	after T1 st	arts.		

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
AoA setup		Setup 1 defined in A.3.15				
Assumption for UE beams Note 10		Rough				

EDDE ratio of DDCCH DM	dB			0			
EPRE ratio of PDCCH DMRS to SSS		иь			U		
EPRE ratio of PDCCH to I	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS 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 <sub>0</sub>	Config 1	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q <sub>1</sub>	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
•		CS					
M	Config 1	dBm/12			-104.7		
$N_{oc}$	_	0 KHz					
Propagation condition				TDI	A 30ns 75	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- 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: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.3.1-4: Void Table A.7.5.5.3.1-5: Void

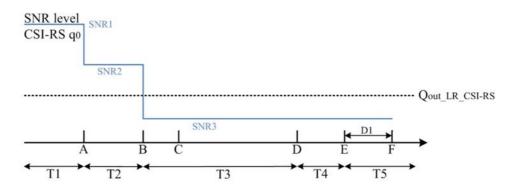


Figure A.7.5.5.3.1-1: SNR variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

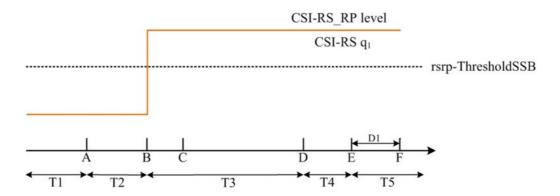


Figure A.7.5.5.3.1-2: CSI-RS\_RP level variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

#### 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.7.5.5.4.1-2 shows the variation of the downlink L1-RSRP 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 5 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.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Pa	rameter	Test Config.	Unit	Value	Comment
				Test 1	
Active PCell		1		Cell 1	
RF Channel Number		1		1	
Duplex mode		1		TDD	
TDD Configuration		1		TDDConf.3.1	
BW <sub>channel</sub>		1		100: N <sub>RB,c</sub> = 66	
Data RBs allocated		1		66	
PDSCH/PDCCH subo	carrier spacing	1	kHz	120	
DL initial BWP config		1		DLBWP.0.1	
DL dedicated BWP co		1		DLBWP.1.1	
UL initial BWP config		1		ULBWP.0.1	
UL dedicated BWP co		1		ULBWP.1.1	
PDSCH Reference C		1		SR.3.2 TDD	
RMSI CORESET Ref	erence Channel	1		CR.3.1 TDD	
Dedicated CORESET	Reference Channel	1		CCR.3.1 TDD	
OCNG parameters		1		OP.1	
CP length		1		Normal	
PDSCH/PDCCH TCI	state	1		TCI.State.0	
CSI-RS for tracking		1		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
SMTC Configuration				SMTC.3	
PRACH Configuration	า	_		FR2 PRACH	40004
		1		configuration 4	A.3.8.3.4
DRX configuration		1		DRX.3	A.3.3.3
CSI-RS configuration	for BFD/CBD/RLM	1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS index assigne	ed as BFD RS (q <sub>0</sub> )	1		0	
CSI-RS index assigne		1		1	
CSI-RS index assigned		1		0,1	
Beam failure	DCI format	1		1-0	
detection transmission	Number of Control OFDM symbols	1		2	
parameters	Aggregation level	1	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1	dB	0	
	DMRS precoder granularity	1		REG bundle size	
	REG bundle size	1		6	
Gap pattern ID		1		N/A	

rlmInSyncOutOfSyncThreshold	1		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB	1	dBm/SCS	-95	Threshold used for Q <sub>in_LR_SSB</sub>
powerControlOffsetSS	1		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount	1		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer	1		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for CSI reporting	1		CSI-RS.3.1 TDD	A.3.14.2
reportConfigType	1		periodic	
reportQuantity	1		cri-RI-PMI-CQI	
CSI reporting periodicity	1	slot	40	
CSI reporting offset	1	slot	4	
T310	1	ms	1000	
N310	1		2	
T1	1	S	1	The UE shall be fully synchronized to cell 1 during T1
T2	1	S	5.43	
T3	1	S	5.16	
T4	1	S	0	
T5	1	S	0.31	
D1	1	S	0.27	
Note 1: UE-specific PDCCH is not transmitted	l after T1 st	arts.		

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	nit Test 1				
			T1	T2	Т3	T4	T5
AoA setup				Setup 1	l defined in	A.3.15	
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DN	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	MRS to SSS dB						
EPRE ratio of PBCH to PBCH DMRS dB							
EPRE ratio of PSS to SSS	EPRE ratio of PSS to SSS						
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_CSI-RS of set q <sub>0</sub>	Config 1	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_CSI-RS of set q <sub>1</sub>	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q <sub>1</sub>	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS					
$N_{oc}$	Config 1	dBm/12	2 -104.7				
¹ voc		0 KHz					
Propagation condition	·			TDI	A 30ns 7	5Hz	

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4:	Void
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 REs carrying CSI-RS.
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in
	clause A.3.6.
Note 10:	
	test system implementation.
Note 11:	This value allows up to 1dB degradation from applied SNR to UE baseband.

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

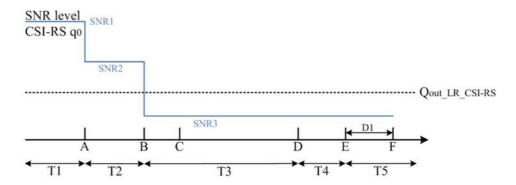


Figure A.7.5.5.4.1-1: SNR variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

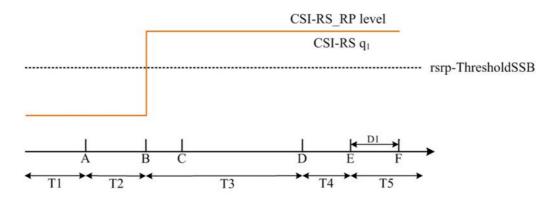


Figure A.7.5.5.4.1-2: CSI-RS\_RP level variation for CSI-RS based beam failure detection and link recovery testing in DRX mode

#### A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set  $q_1$ .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set  $q_1$ . The UE shall not transmit preamble on a beam associated with the candidate beam set  $q_1$  earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

# A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

#### A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set  $q_0$  in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-2 shows the variation of the downlink L1-RSRP 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 5ms. 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	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Pa	Test Config.	Unit	Value	Comment	
				Test 1	
Active PCell	1-2		Cell 1		
RF Channel Number	1-2		1		
Duplex mode		1-2		TDD	
TDD Configuration		1-2		TDDConf.3.1	
BW <sub>channel</sub>		1-2		100: N <sub>RB,c</sub> = 66	
Data RBs allocated		1-2		66	
PDSCH/PDCCH subo	carrier spacing	1-2	kHz	120	
DL initial BWP configu	uration	1-2		DLBWP.0.1	
DL dedicated BWP co	onfiguration	1-2		DLBWP.1.1	
UL initial BWP configu		1-2		ULBWP.0.1	
UL dedicated BWP co		1-2		ULBWP.1.1	
PDSCH Reference C	hannel	1		SR.3.2 TDD	
		2		SR.3.3 TDD	
RMSI CORESET Ref	erence Channel	1		CR.3.1 TDD	
		2		CR.3.2 TDD	
Dedicated CORESET	Reference Channel	1		CCR.3.1 TDD	
		2		CCR.3.7 TDD	
OCNG parameters		1-2		OP.1	
CP length		1-2		Normal	
PDSCH/PDCCH TCI	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
		2		SSB.2 FR2	
SMTC Configuration		1-2		SMTC.1	
PRACH Configuration	า	1-2		FR2 PRACH	A.3.8.3.2
		1-2		configuration 2	A.3.8.3.2
DRX configuration		1-2		OFF	
SSB index assigned a	as BFD RS (q <sub>0</sub> )	1-2		0	
SSB index assigned a	as CBD RS (q <sub>1</sub> )	1-2		1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control	1-2		2	
transmission	OFDM symbols	1-2		2	
parameters	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical				
	PDCCH RE energy to	1-2	dB	0	
average SSS RE energy					
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	

	DMRS precoder granularity	1-2		REG bundle size	
	REG bundle size	1-2		6	
Gap pattern ID		1-2		N/A	
rlmInSyncOutOfSyncT	hreshold	1-2		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1	dBm/SCS	-95	Threshold used for
		2	dBill/000	-92	Qin_LR_SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceN	faxCount (	1-2		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection	beamFailureDetectionTimer			pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration f	CSI-RS configuration for CSI reporting			CSI-RS.3.1 TDD	
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodici	ty	1-2	slot	40	
CSI reporting offset		1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2		2	
T1		1-2	S	1	The UE shall be fully synchronized to cell 1 during T1
T2	1-2	S	2.6	_	
T3		1-2	S	1.64	
T4	1-2	S	0		
T5	1-2	S	1.01		
D1	1-2	S	0.97		
	ations are assigned to the PDCCH is not transmitted			me period T1.	

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
AoA Setup				Setup1	defined in A	A.3.15.1	
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DM	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_SSB of set q <sub>0</sub>	Config 1-2	dB	5 <sup>Note 11</sup>	-3 <sup>Note 11</sup>	-12	-12	-12
SNR_SSB of set q <sub>1</sub>	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q <sub>1</sub>	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	CS	-101.5	-101.5	-81.5	-81.5	-81.5

$N_{oc}$	Config 1-2   dBm/12   -104.7		-104.7			
	ion condition		O KI IZ	TDL-A 30ns 75Hz		
Note 1:		used such that the	resources	in Cell 1 are fully allocated and a constant total		
				ed for all OFDM symbols.		
Note 2:				ssigned to the UE prior to the start of time period T1.		
Note 3:	NZP CSI-RS res	source set configu	ration for C	SI reporting are assigned to the UE prior to the start		
	of time period T	1.				
Note 4:	Void					
Note 5:	The timers and I	ayer 3 filtering rela	ated param	neters are configured prior to the start of time period		
	T1.					
Note 6:				an the device under test as part of OCNG.		
Note 7:				ratio over the SSS REs.		
Note 8:		1 ' '	,	T5 is denoted as SNR1, SNR2 and SNR3		
		gure A.7.5.5.5.1-1				
Note 9:				E which supports 2RX on at least one band. For		
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in					
	clause A.3.6.					
Note 10:		7 1	ım given in	B.2.1.3 and does not limit UE implementation or test		
Nata 44.	system impleme		-l	anniad CND to LE baseband		
Note 11:	This value allows up to 1dB degradation from applied SNR to UE baseband.					

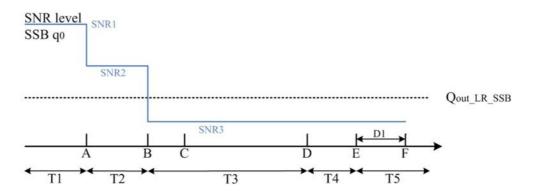


Figure A.7.5.5.5.1-1: SNR variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

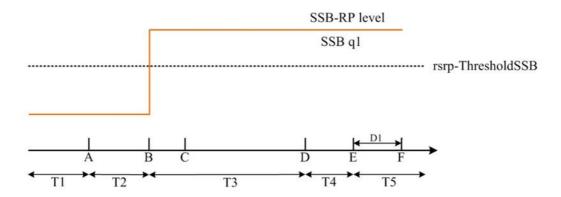


Figure A.7.5.5.5.1-2: SSB\_RP level variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

#### 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 SCell 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 PCell (Cell 1) and one 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 SCell (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.

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 Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, 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 PSCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell'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 first DL slot that occurs after the beginning of SCell's DL slot ( $i+T_{BWPswitchDelay}$ ) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}+k_1$ ). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}$ ).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

#### During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half subframe immediately after *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 first DL slot that occurs after the beginning of SCell's DL slot (j+T<sub>BWPswitchDelay</sub>) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (j+T<sub>BWPswitchDelay</sub>+ $k_1$ ). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot (j+T<sub>BWPswitchDelay</sub>).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment

NR RF Channel Number		1, 2	Two NR radio channels are used for this 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 PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.1.1-3: 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		TDDC	Conf.3.1	
BW <sub>channel</sub>		100 MHz:	: N <sub>RB,c</sub> = 66	
Active BWP ID		0	1, 2	
Downlink initial BWP Configuration		DLB\	VP.0.2	
Uplink initial BWP Configuration		ULBWP.0.2	N.A.	
Downlink active BWP-0 Configuration		DLBWP.0.2	-	
Downlink active BWP-1 Configuration		N.A.	DLBWP.1.1	
Downlink active BWP-2 Configuration		N.A.	DLBWP.1.3	
Uplink active BWP-0 Configuration		ULBWP.0.2	N.A.	
Uplink active BWP-1 Configuration		N.A.	N.A.	
Uplink active BWP-2 Configuration		N.A.	N.A.	
PDSCH Reference measurement channel		SR.3	1 TDD	
TRS configuration		TRS.2.1 TDD		
TCI state		TCI.S	State.0	
RMSI CORESET parameters		CR.3	.1 TDD	
Dedicated CORESET parameters		CCR.3	3.1 TDD	
OCNG Patterns		0	P.1	
SSB Configuration		SSB.	.1 FR2	
SMTC Configuration		SM	TC.1	
Correlation Matrix and Antenna		1x2	Low	
Configuration				
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	<u> </u>			
EPRE ratio of OCNG DMRS to SSS(Note				
1)	]			
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				

Propagation Condition			AWGN	AWGN	
Note 1: OCNG shall be used such that both cells are full			y allocated and a constant total t	ransmitted 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 case

Parameter	Unit	Cell 1	Cell 2			
Angle of arrival configuration		Setup 1 defined in	n clause A.3.15.1			
Assumption for UE beams Note 6		Fine	Fine			
$N_{oc}^{}$ Note1	dBm/15kHz	-112	-112			
$N_{oc}^{}$ Note1	dBm/SCS	-103	-103			
SS-RSRP <sup>Note2</sup>	dBm/SCS Note3	-85	-85			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	18	18			
Io <sup>Note4</sup>	dBm/95.04 MHz <sup>Note4</sup>	-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.
- Equivalent power received by an antenna with 0 dBi gain at the centre of the guiet zone Note 4:
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
- Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test Note 6: system implementation.

#### A.7.5.6.1.1.2 **Test Requirements**

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k_1)$ .

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelay}+k_1)$ .

Where, k<sub>1</sub> 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<sub>BWPswitchDelay</sub> defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell 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 PCell interruption during SCell 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 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell 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 first UL slot that occurs after the beginning of DL slot (i+  $T_{BWPswitchDelay}$ + $k_1$ ), (j+  $T_{BWPswitchDelay}$ + $k_1$ ), 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 SCell 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 SCell (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.

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 Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, 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 PCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

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 SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell'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 first DL slot that occurs after the beginning of SCell's DL slot ( $i+T_{BWPswitchDelay}$ ) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}+k_1$ ). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}$ ).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

#### During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after *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 first DL slot that occurs after the beginning of SCell's DL slot  $(j+T_{BWPswitchDelay})$  as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+k_1)$ . The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay})$ .

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.2.1-3: 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		TDD	
TDD configuration	Config 1		Not Applicable	TDDConf.3.1
Ü	Config 2		TDDConf.1.1	
	Config 3	1	TDDConf.2.1	
BW <sub>channel</sub>	Config 1,2	MHz	10 MHz: N <sub>RB,c</sub> = 52	100 MHz: N <sub>RB,c</sub> = 66
	Config 3	1	40 MHz: N <sub>RB,c</sub> = 106	
Active BWP ID			0	1, 2
Downlink initial BWP	Configuration		DLBW	P.0.2
Uplink initial BWP Co			ULBWP.0.2	N.A.
Downlink active BWF	P-0 Configuration		DLBWP.0.2	-
Downlink active BWF			-	DLBWP.1.1
Downlink active BWF	P-2 Configuration		-	DLBWP.1.3
Uplink active BWP-0	Configuration		ULBWP.0.2	-
Uplink active BWP-1	Configuration		-	N.A.
Uplink active BWP-2	Configuration		-	N.A.
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	CR.3.1 TDD
parameters	Config 2	I	CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	CCR.3.1 TDD
CORESET	Config 2		CCR.1.1 TDD	
parameters	Config 3		CCR.2.1 TDD	
OCNG Patterns			OP	
SSB Configuration	Config 1,2	1	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			SMT	
Correlation Matrix an	d Antenna		NA NA	1x2 Low
Configuration	200		Link only, see clause A.3.7A	
EPRE ratio of PSS to		dB	0	0
	EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS		1		
EPRE ratio of PDCCH DMRS to SSS		1		
EPRE ratio of PDCCH to PDCCH DMRS		1		
EPRE ratio of PDSCH bMRS to SSS		4		
EPRE ratio of PDSCH to PDSCH		1		
EPRE ratio of OCNG DMRS to SSS(Note				
1) EPRE ratio of OCNG	to OCNG DMPS	+		
(Note 1)	IO OCING DIVIKS			
Propagation Conditio	n		NA	AWGN
1, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,			Link only, see clause A.3.7A	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: SS-RSRP and SCH\_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration			Setup 1 defined in clause A.3.15.1
Assumption for UE beams Note 6			Fine
Note1	dBm/15kHz		-112
Note1	dBm/SCS	NA Link only, see clause	-103
SS-RSRP <sup>Note2</sup>	dBm/SCS Note3	A.3.7A	-85
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB		18
Io <sup>Note4</sup>	dBm/95.04 MHz <sup>Note4</sup>		-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the guiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

#### A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k1)$ .

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot  $(j+T_{BWPswitchDelav}+kI)$ .

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%.

If the UE doesn't support per-FR gap,

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.

Otherwise no interruption due to BWP switch on SCell is allowed.

All of the above test requirements shall be fulfilled in order for the observed SCell 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/NACK in the first UL slot that occurs after the beginning of 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/NACK.

#### 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 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 on the first DL slot that occurs after the beginning of 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 the first UL slot that occurs after the beginning of slot ( $i+T_{BWPswitchDelay}+k1$ ). The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the first DL slot that occurs after the beginning of 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 first slot of the half subframe immediately after 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 on the first DL slot that occurs after the beginning of 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 on

the first UL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay}+k1)$ . The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the first DL slot that occurs after the beginning of slot  $(j+T_{BWPswitchDelay})$ .

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

	Config	Description			
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	Void.				
Note 2:	A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in				
	A.7.5.6.1.3.	·			

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 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 rat	EPRE ratio of PDSCH to PDSCH			
EPRE rat	EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE rat	tio of OCNG to OCNG DMRS (Note			
1)	•			
Propagation Condition			AWGN	
Note 1:	e 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:				
	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 cla	ause 12 of T	S 38.213 [3].	

Table A.7.5.6.1.3.1-4: 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
Assumpt	ion for UE beams Note 6		Fine
N <sub>oc</sub> Note 1	N <sub>oc</sub> Note 1		-112
Noc <sup>Note 1</sup>		dBm/SCS	-103
SS-RSRI	Note 2	dBm/120 kHz <sup>Note3</sup>	-85
Ês/Iot		dB	18
Ês/Noc Not	e 5	dB	18
Io <sup>Note2</sup> dBr MH			-56
Note 1: Note 2:	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		
Note 3: Note 4:	interference and noise at each receiver antenna port.		
Note 5: Note 6:	te 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/NACK for PCell from the first UL slot that occurs after the beginning of DL slot  $(i+T_{BWPswitchDelay}+k1)$ .

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of 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%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of 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/NACK.

#### 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 PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of 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 of initial condition in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

#### During T1,

Time period T1 starts when a RRCReconfiguration with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted i. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}$  as defined in clause 8.6.3 and starts to report NR Slot length valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot i +  $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + k1}$ . The UE shall be continuously scheduled on PCell's BWP-1 NR Slot length starting from the first DL slot that occurs after the beginning of DL slot i +

 ${\it T}_{RRCprocessingDelay} + {\it T}_{BWPswitchDelayRRC}$ 

NR Slot length

 $T_{RRCprocessingDelay}$  and  $T_{BWPswitchDelayRRC}$  are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configurationis sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.5.6.2.1.1-2: 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 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 SA

Parameter		Unit	Cell 1
Frequency Range			FR2
Duplex mode			TDD
TDD configuration			TDDConf.3.1
BW <sub>channel</sub>			100 MHz: N <sub>RB,c</sub> = 66
Active BWP ID			1
Initial DL BWP Confi	guration		DLBWP.0.2
Initial UL BWP Confi			ULBWP.0.2
Initial Condition	Active DL BWP-1		DLBWP.1.3
	Configuration		
	Active UL BWP-1		ULBWP.1.3
	Configuration		
Final	Active DL BWP-1		DLBWP.1.1
Condition	Configuration		
	Active UL BWP-1		ULBWP.1.1
	Configuration		
PDSCH Reference n	neasurement channel		SR.3.1 TDD
RMSI CORESET par	rameters		CR.3.1 TDD
Dedicated CORESE	T 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
Antenna Configuration	on		1x2
Propagation Condition			AWGN
EPRE ratio of PSS to S		dB	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS		]	
EPRE ratio of PDCCH DMRS to SSS		]	
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS		]	
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to	OCNG DMRS (Note 1)		

Note 1:	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:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled
	as AWGN of appropriate power for N₀c to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
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].

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Parameter		Unit	Cell 1
Angle of arrival configuration			Setup 1 according to table A.3.15
Assumption for UE beams Note 5			Fine
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		440
Note1	NR_TDD_FR2_F	-ID /4.51-I	
oc oc	NR_TDD_FR2_G	dBm/15kHz	-112
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
Note1	NR_TDD_FR2_F	dBm/SCS	-103
	NR_TDD_FR2_G	ubiii/303	
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
SS-RSRP <sup>Note2</sup>	NR_TDD_FR2_F	dBm/SCS Note3	-85
	NR_TDD_FR2_G	Notes	
	NR_TDD_FR2_T		
^ /	NR_TDD_FR2_Y	٩D	40
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	18
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
IoNote2	NR_TDD_FR2_F	dBm/95.04	-56
	NR_TDD_FR2_G	MHz Note4	
	NR_TDD_FR2_T		
N. d. I. d.	NR_TDD_FR2_Y	<u> </u>	
			ot specified in the test is
	appropriate power for $j$		e and shall be modelled as ed.
Note 2: SS-RSRP and lo levels have been derived from other parameters for			ther 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: Information about types of UE beam is given in B.2.1.3 and does not limit UI implementation or test system implementation.			.2.1.3 and does not limit UE

#### A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$  and starts to report valid ACK/NACK for the PCell

from the first UL slot that occurs after the beginning of DL slot  $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$ .

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

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%.

## A.7.5.7 PSCell addition and release delay

#### A.7.5.7.1 Addition and Release Delay of known NR PSCell

#### A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of six time periods with durations T1, T2, T3, T4, T5 and T6, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the Cell2 becomes known to the UE. Therefore, during T2 the UE shall report Event triggered report.

The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell 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 point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

During T4, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T5.

During T5, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T6.

During T6, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

Config	Description			
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz			
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz			
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz			
Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

Parameter		Unit	Value	Comment		
RF Ch	RF Channel Number		1, 2	Two radio channels are used for this test		
Active	Active PCell		Cell 1	PCell on RF channel number 1 in FR1		
Neighb	Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2		
A4	Hysteresis	dB	0	Hysteresis for event A4		
	Threshold RSRP	dBm	-118	Threshold for event A4		
	Time to Trigger	S	0	Time to trigger for event A4		
DRX			OFF	For both PCell and PSCell once activated		
Measu	rement gap pattern ID	0		Gaps are configured before T2 and released before T3.		
PRACH configuration in Cell 2			FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.		
CSI reporting periodicity and offset configuration for Cell 2		ms	2			
T1		S	5	During this time the PCell is known and Cell 2 is unknown.		
T2		s	1	During this time the UE shall identify neighbour cell 2 and report event B1.		
Т3		s	3.5	During this time the test system transmits the RRC messages to release measurement gap and add PSCell.		
T4		S	1	During this time the UE adds the PSCell.		
T5		s	1	During this time the UE sends CSI reports for PSCell.		
Т6		s	1	During this time the UE releases the PSCell.		

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit Config Cell 1		Cell2						
				T1	T2	T3	T4	T5	T6
Frequency Range		1,2,3	FR1		•	FF	R2		
Duplex mode		1	FDD	TDD					
		2,3	TDD	- TDD					
TDD configuration		1	_						
		2	TDDConf.1.1			1			
		3	TDDConf.2.1						
BW <sub>channel</sub>	NAL 1-	1,2	10: N <sub>RB,c</sub> = 52	400 N					
	MHz	3	40: N <sub>RB,c</sub> = 106	Ì	100: $N_{RB,c} = 66$				
Data RBs allocated		1,2	52			_			
		3	106	48					
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1			DLBV	/P.0.1		
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1			ULBV	/P.0.1		
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1			DLBV	/P.1.1		
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1			ULBV	/P.1.1		

PDSCH Reference Measurement		1	SR.1.1 FDD	
Channel		2	SR.1.1 TDD	SR.3.3 TDD
		3	SR.2.1 TDD	
TRS configuration		1,2,3	_	TRS.2.1 TDD
TCI state		1,2,3	_	TCI.State.0
RMSI CORESET parameters		1	CR.1.1 FDD	
		2	CR.1.1 TDD	CR.3.2 TDD
		3	CR.2.1 TDD	
Dedicated CORESET parameters		1	CCR.1.1 FDD	
		2	CCR.1.1 TDD	CCR.3.7 TDD
		3	CCR.2.1 TDD	
OCNG Patterns <sup>Note1</sup>		1,2,3	OP.1	OP.3
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2
		3	SSB.2 FR1	55B.2 FR2
SMTC configuration		1,2,3	SMTC.2	SMTC.1
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120
		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	dB	1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
Propagation Condition		1,2,3	N/A	AWGN

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Void

Note 4: Void

Note 5: Void

#### Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell 2		
				T1	T2 T3 T4 T5 T6	
Angle of arrival configuration		1,2,3		Setup 2a according to clause		
				A.3.15.2.1		
Assumption for UE beams Note 3				Rough		
Ês	dBm/SCS	1,2,3	Link only,	-∞ -81		
SSB_RP Note1, Note2	dBm/SCS	1,2,3	see clause	-∞ -81		
$\hat{E}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note1, Note 4	dB	1,2,3	A.3.7A	-∞ 4.88		
Io Note 1, Note2	dBm/95.04 MHz	1,2,3		N/A -56.41		

Note 1: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 4: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T4.

The UE shall transmit at least one periodic CSI report for PSCell during T5.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T6.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

#### A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

#### A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

Config	Description				
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
Note 1: The UE is only required to be tested in one of the supported test configurations					

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1 in FR1
Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF
		Cell 2	channel number 2 in FR2
DRX		OFF	For both PCell and PSCell once activated
PRACH configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in
		FRZ FRACH Configuration 2	Clause A.3.8.3.2.

CSI reporting periodicity and offset configuration for Cell 2	ms	[2]	
T1	S	5	During this time the PCell is known and Cell 2 is unknown.
T2	S	1	During this time the UE adds the PSCell.
T3	S	1	During this time the UE sends CSI reports for PSCell.
T4	S	1	During this time the UE releases the PSCell.

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2
				T1 T2 T3 T4
Frequency Range		1,2,3	FR1	FR2
Duplex mode		1	FDD	TDD
		2,3	TDD	וסטו
TDD configuration		1	_	
		2	TDDConf.1.1	TDDConf.3.1
		3	TDDConf.2.1	
BW <sub>channel</sub>	MHz	1,2	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66
	IVII IZ	3	40: N <sub>RB,c</sub> = 106	100. NRB,c = 00
Data RBs allocated		1,2	52	40
		3	106	48
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1	DLBWP.0.1
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1	ULBWP.0.1
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1	DLBWP.1.1
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1	ULBWP.1.1
PDSCH Reference Measurement		1	SR.1.1 FDD	
Channel		2	SR.1.1 TDD	SR.3.3 TDD
		3	SR.2.1 TDD	
TRS configuration		1,2,3	_	TRS.2.1 TDD
TCI state		1,2,3	_	TCI.State.0
RMSI CORESET parameters		1	CR.1.1 FDD	
		2	CR.1.1 TDD	CR.3.2 TDD
		3	CR.2.1 TDD	
Dedicated CORESET parameters		1	CCR.1.1 FDD	
		2	CCR.1.1 TDD	CCR.3.7 TDD
		3	CCR.2.1 TDD	
OCNG Patterns <sup>Note1</sup>		1,2,3	OP.1	OP.3
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2
		3	SSB.2 FR1	
SMTC configuration		1,2,3	SMTC.2	SMTC.1
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120
		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	dB	1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
Propagation Condition		1,2,3	AWGN	AWGN

Note 1:	OCNG shall be used such that and a constant total transmitted power spectral density is achieved for all
	OFDM symbols.
Note 2:	Void
Note 3:	Void
Note 4:	Void
Note 5:	Void

Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell 2			
				T1	T2	T3	T4
Angle of arrival configuration		1,2,3		Setup 2a according to clause			clause
					A.3	3.15.2.1	
Assumption for UE beams Note 3				Rough			
Ês	dBm/SCS	1,2,3	Link only,	-∞ -81			
SSB_RP Note1, Note 2	dBm/SCS	1,2,3	see clause	-∞ -81			
$\hat{E}_{s}/I_{ m ot\ BB}$ Note1, Note 4	dB	1,2,3	A.3.7A	-∞ 4.88			
lo Note 1, Note 2	dBm/95.04	1,2,3		N/A -56.41			
	MHz						

- Note 1: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
- Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 4: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.5.8 Active TCI state switch delay

#### A.7.5.8.1 MAC-CE based active TCI state switch

### A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

#### A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 1 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.1.1.1-1 and Figure A.7.5.8.1.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. 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 UE is 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. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+  $T_{HARQ}$  +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+  $T_{HARQ}$  +3 ms + ( $T_{first-SSB}$  +  $T_{SSB-proc}$ ).

Table A.7.5.8.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment	
NR RF Channel Number		1	One NR radio channel is used for this	
		I	test	
Active PCell		Cell 1	PCell on RF channel number 1.	
CP length		Normal		
DRX		OFF		
T1	S	0.2		
T2	S	0.2		

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1		
Frequency Range		FR2		
Duplex mode		TDD		
TDD configuration		TDDConf.3.1		
BW <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 66		
Data RBs allocated		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.3.2 TDD		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		OP.5		

SSB Configuration		SSB.1 FR2			
SMTC Configuration		SMTC.1			
TCI State 0		TC. State.2			
TCI State 1		TCI.State.3			
TRS Configuration		TRS.2.1 TDD			
		TRS.2.2 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 a constant total transmitted power spectral					

density is achieved for all OFDM symbols.

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 1					
		SSB0		S	SSB1		
		T1	T2	T1	T2		
Angle of arrival configuration		Setup 3 According to clause A.3.15.3					
		AoA1		AoA2			
Assumption for UE beams Note 6		Ro	ugh	Rough			
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
Ê <sub>s</sub> /I <sub>ot</sub> BB Note 7	dB	8.3	8.3	-Infinity	8.3		
lo Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0		

- Note 1: Void
- Note 2: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 7: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

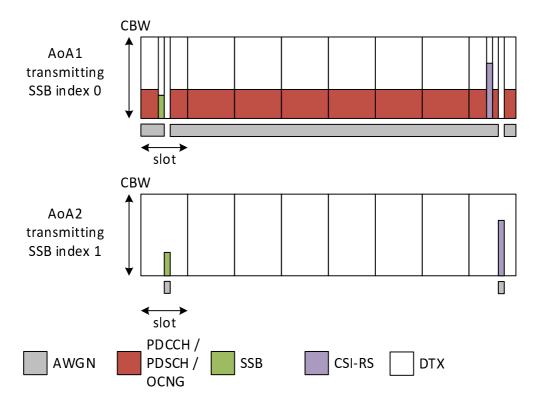


Figure A.7.5.8.1.1.1-1: Time multiplexed downlink transmissions during T1

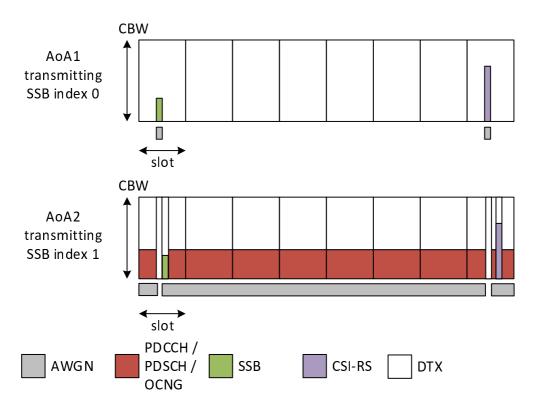


Figure A.7.5.8.1.1.1-2: Time multiplexed downlink transmissions during T2

#### A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till  $n+T_{HARQ}+3 ms$
- be able to start receiving on TCI state 1 after n+  $T_{HARQ}$  +5 ms +  $T_{first-SSB}$

#### A.7.5.8.2 RRC based active TCI state switch

#### A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

#### A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.2.1.1-1 and Figure A.7.5.8.2.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+  $T_{RRC\_processing} + T_{first-SSB} + 2ms$ .

Table A.7.5.8.2.1.1-1: Supported test configurations

Config	Description				
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	
T2	S	0.2	

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCl state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW <sub>channel</sub>		100 MHz: N <sub>RB,c</sub> = 66
Data RBs allocated		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.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.2
TCI State 1		TCI.State.3
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic

Number of reported RS		2			
L1-RSRP reporting period	slot	640			
timeRestrictionForChannelMeasurements		configured			
TRS Configuration		TRS.2.1 TDD			
		TRS.2.2 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	1				
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note	1				
1)					
Propagation Condition		AWGN			
Note 4. OCNIC shall be used such that the personners in Call 4 are fully allocated and a					

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.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit		C	ell 1	
		SSB0		SS	SB1
		T1	T2	T1	T2
Angle of arrival		Setup 3 According to clause A.3.15.3			
configuration		AoA1		AoA2	
Assumption for UE beams Note 6		Rough		Rough	
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ BB Note 7	dB	8.3	8.3	-Infinity	8.3
lo Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0

- Note 1: Void
- Note 2: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 7: Calculation of Es/loteB includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor  $\Delta$ MBP from TS 38.101-2 [19] Table 6.2.1.3-4.

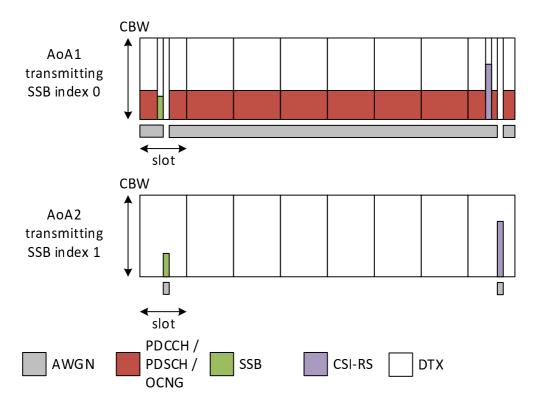


Figure A.7.5.8.2.1.1-1: Time multiplexed downlink transmissions during T1

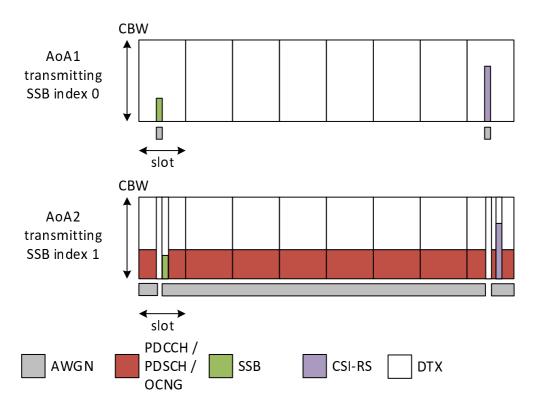


Figure A.7.5.8.2.1.1-2: Time multiplexed downlink transmissions during T2

#### A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+  $T_{RRC\_processing}$  +  $T_{first-SSB}$  + 2ms.

### A.7.6 Measurement procedure

### A.7.6.1 Intra-frequency Measurements

#### A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

#### A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

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.7.6.1.1.1-2, 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	-11	
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		4 0	3 μs	Synchronous cells
Cell 2		1, 2	·	
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		II 2	
			T1	T2	T1	T2	
TDD configuration		1, 2	TDDC	onf.3.1	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	1, 2	100: N <sub>F</sub>	RB,c = 66	100: Na	RB,c = 66	
Data RBs allocated		1	2	4	2	4	
		2	4	8	4	8	
Intial BWP configuration		1, 2	DLBV	/P.0.1	DLBW	/P.0.1	
			ULBV		ULBW	/P.0.1	
Active DL BWP configuration		1, 2	DLBV	/P.1.1	DLBW	/P.1.1	
Active UL BWP configuration		1, 2	ULBV	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2	SS	SB	SSB		
PDSCH RMC configuration		1	SR.3.2 TDD N		/A		
		2	SR.3.	3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD N		/A		
ooningaration		2	CR.3.	2 TDD	N/	/A	
Dedicated CORESET RMC configuration		1	CCR.3	.1 TDD	N/	/A	
oogaranon		2	CCR.3	.7 TDD	N/	/A	
TRS configuration		1, 2	TRS.2.1 TDD N//		/A		
PDSCH/PDCCH TCI states		1, 2	TCI.S	tate.2	N/	/A	

PDSCH/PDCCH subcarrier	kHz	1, 2	120	120
spacing				
OCNG Patterns		1, 2	OP.5	N/A
cellIndividualOffset	dB	1~2	N/A	16
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

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	Се	Cell 1		ell 2	
			T1	T2	T1	T2	
AoA setup		1, 2	Se	etup 3 defir	ed in A.3.1	5.3	
			Ao	A1	Ac	oA2	
Beam assumption Note 4		1,2	Ro	Rough		Rough	
Es	dBm/SCS	1	-89	-89	-Infinity	-89	
		2	-86	-86	-Infinity	-86	
$\hat{E}_{_{s}}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12	
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89	
		<u>2</u>	-86	-86	-Infinity	-86	
Io	dBm/95.04MHz	1	-64.41	-64.41	-Infinity	-64.41	
		2	-61.41	-61.41	-Infinity	-61.41	
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defined in Figure A.7.6.1.1.1-1		1.1-1		

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Void
- Note 3: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Calculation of Es/Iot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

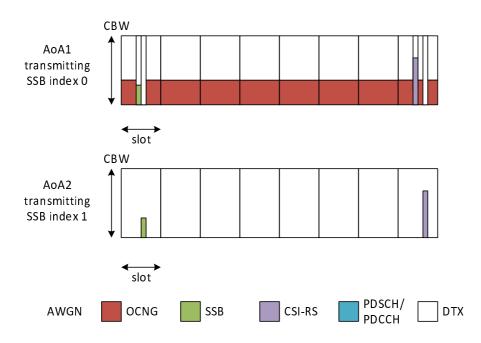


Figure A.7.6.1.1.1: Time multiplexed downlink transmissions (Config 1 example)

#### 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

#### A.7.6.1.2 SA event triggered reporting test without gap under DRX

#### A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

Cor	nfiguration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only 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.7.6.1.2.1-2  $\sim$  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 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.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	onfig Cell 1		Ce	II 2
			T1 -	T2 T1		T2
TDD configuration		1, 2	TDDConf.3	3.1	TDDConf.3.1	
BW <sub>channel</sub>	MHz	1, 2	100: N <sub>RB,c</sub> =	66	100: N <sub>RB,c</sub> = 66	
Data RBs		1, 2	66		6	6
allocated						
Intial BWP		1, 2	DLBWP.0	.1	DLBW	/P.0.1
configuration			ULBWP.0		ULBW	
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	SR.3.2 TD	D	N	/A
configuration		2	SR.3.3 TD	D	1	
RMSI CORESET RMC		1	CR.3.1 TD	D	N/A	
configuration		2	CR.3.2 TD	D	N	/A
Dedicated CORESET RMC		1	CCR.3.1 TI	OD OC	N	/A
configuration		2	CCR.3.7 TI	OD	N	/A
TRS configuration		1, 2 1, 2	TRS.2.1 TI	DD	N	/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.	.2	N	/A
PDSCH/PDCCH	kHz	1, 2	120		12	20
subcarrier						
spacing						
OCNG Patterns		1, 2	OP.1		OF	P.1
SSB		1	SSB.3 FR	2	SSB.3	3 FR2
		2	SSB.4 FR	2	SSB.4	4 FR2
Propagation Condition		1, 2			AW	/GN

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	Cell 1		II 2	
			T1	T2	T1	T2	
AoA setup		1, 2	S	etup 1 defi	ned in A.3.1	5.1	
Beam assumption Note 4		1,2		Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52	
$N_{oc}$ Note 2	dBm/15 KHz	1, 2		-98			
Note 2	dBm/SCS	1		-89			
1 oc		2			-86		
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	

$\hat{E}_s/N_{oc}$	$\hat{E}_s/N_{oc}$ dB		1, 2	4	4	-Infinity	4	
Io		dBm/95.04MHz	1, 2	-54.53	-52.18	See Cell	1 columns	
Note 1:	The reso	ources for uplink trans	mission are assigned	to the UE	orior to the	start of time	e period	
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for							
	$N_{oc}$ to	be fulfilled.						
Note 3:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation							
Note 5:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB <sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.							

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<sub>DCCH</sub> 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

Configuration	Description
---------------	-------------

Ī	1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
ſ	2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
ſ	Note:	The UE is only required to be tested in one of the supported test configurations.				

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2  $\sim$  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 resource #0	Resource #1 is not used
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2		
			T1	T2	T1	T2	
TDD configuration		1, 2	TDDC	TDDConf.3.1		TDDConf.3.1	
BW <sub>channel</sub>	MHz	1, 2	100: N	100: N <sub>RB,c</sub> = 66		RB,c = 66	
Data RBs allocated		1	24		24		
		2	4	48	4	18	

Intial BWP configuration		1, 2	DLBWP.0.1	DLBWP.0.1
			ULBWP.0.1	ULBWP.0.1
Active DL BWP configuration		1, 2	DLBWP.1.2	DLBWP.1.1
Active UL BWP configuration		1, 2	ULBWP.1.2	ULBWP.1.1
RLM-RS		1, 2	CSI-RS	SSB
PDSCH RMC configuration		1	SR.3.2 TDD	N/A
		2	SR.3.3 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD	N/A
		2	CR.3.2 TDD	N/A
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD	N/A
		2	CCR.3.7 TDD	N/A
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.2	N/A
PDSCH/PDCCH subcarrier	kHz	1, 2	120	120
spacing				
OCNG Patterns		1, 2	OP.5	N/A
cellIndividualOffset	dB	1~2	N/A	16
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

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		ell 2
			T1	T2	T1	T2
AoA setup		1, 2	Se	etup 3 defir	ned in A.3.1	5.3
			Ao	A1	Ad	oA2
Beam Assumption <sup>Note 4</sup>		1,2	Ro	Rough		ough
Es	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		<u>2</u>	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64.41	-64.41	-Infinity	-64.41
		2	-61.41	-61.41	-Infinity	-61.41
Time multiplexing of the downlink transmissions from each AoA		1	Defi	Defined in Figure A.7.6.1.3.1-1		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

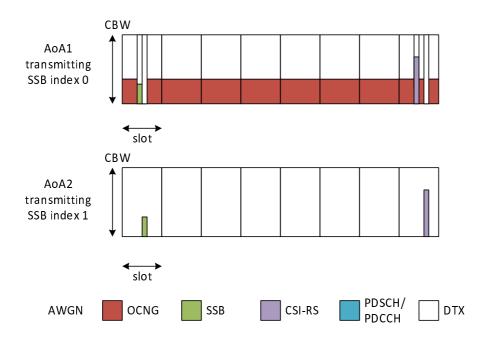


Figure A.7.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

#### 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<sub>DCCH</sub> 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

Co	onfiguration	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 UF 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.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Cell 1)		
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and C	ell 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 TD	D resource #0	Resource #1 is not used
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.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5	•	
T2	S	1, 2	10	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1		Ce	ell 2
			T1	T2	T1	T2
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1	
BW <sub>channel</sub>	MHz	1, 2	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66	

Data RBs allocated		1, 2	66	66
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Active DL BWP configuration		1, 2	DLBWP.1.2	DLBWP.1.1
Active UL BWP configuration		1, 2	ULBWP.1.2	ULBWP.1.1
RLM-RS		1, 2	SCSI-RS	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	
RMSI CORESET RMC		1	CR.3.1 TDD	N/A
configuration		2	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1	CCR.3.1 TDD	N/A
configuration		2	CCR.3.7 TDD	N/A
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI state		1, 2 1, 2	TCI.State.2	N/A
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120	120
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.3 FR2	SSB.3 FR2
		2	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1, 2	AWGN	AWGN

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	Cell 1		II 2		
			T1	T2	T1	T2		
AoA setup		1, 2	S	etup 1 defii	ned in A.3.1	5.1		
Beam Assumption <sup>Note 4</sup>		1,2		Ro	ough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52		
$N_{oc}$ Note 2	dBm/15 KHz	1, 2		-98				
$N_{oc}$ Note 2	dBm/SCS	1		-	89			
1 oc		2		-	·86			
SSB_RP	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, 2	-54.53 -52.18 See Cell 2 colur					

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:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information
	purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation
	or test system implementation
Note 5:	Calculation of Es/lotbb includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB
	for UE multi-band relaxation factor ΔMB <sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

#### 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.7.6.2 Inter-frequency Measurements

# A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

#### A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configurati on	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 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	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	S	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3µs	Synchronous cells.
T1	S	Config 1	5	
T2	S	Config 1	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

Parameter	Unit	Test	Ce	Cell 1		Cell 2		
		configuratio	T1 T2		T1	T2		
		n						
AoA setup		Config 1	Setup 3 as specified in clause A.3.15					
			AoA1 AoA2			AoA2		

Beam Assump	tion <sup>Note 7</sup>		1,2	Ro	ugh	R	ough
NR RF Channe	el Number		Config 1		1		2
Duplex mode			Config 1	Т	DD	-	TDD
TDD configuration	tion		Config 1		onf.3.1	TDDConf.3.1	
BW <sub>channel</sub>		MHz	Config 1		RB,c = 66	100: N <sub>RB,c</sub> = 66	
Data RBs alloc	ated		Config 1	66			66
BWP BW		MHz	Config 1		RB,c = 66	100.1	NRB,c = 66
BWP	Initial DL		Gormig :	, , , , , , , , , , , , , , , , , , ,			11.2,0
configuration	BWP			DLBV	VP.0.1		N/A
	Initial UL BWP		Config 1	ULBV	VP.0.1		N/A
	Dedicated DL BWP			DLBV	VP.1.1		N/A
	Dedicated UL BWP			ULBV	VP.1.1		N/A
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1	O	P.1	(	OP.1
PDSCH Refere measurement	channel		Config 1	SR.3.	1 TDD		-
CORESET Ref			Config 1	CR.3.	1 TDD		-
SMTC configured in A.3.11.1 and			Config 1	SMTC.1		SMTC.1	
spacing	PDSCH/PDCCH subcarrier spacing		Config 1	120		120	
TRS configurat	TRS configuration		Config 1	TRS.2.1 TDD			N/A
PDSCH/PDCC			Config 1	TCI.State.2		N/A	
EPRE ratio of I	PSS to SSS						
EPRE ratio of I	PBCH DMRS			0		0	
EPRE ratio of I	PBCH to PBCH						
EPRE ratio of I to SSS	PDCCH DMRS						
EPRE ratio of I			Config 1				
EPRE ratio of I to SSS	PDSCH DMRS						
EPRE ratio of I PDSCH	PDSCH to						
EPRE ratio of ( to SSS(Note 1)							
EPRE ratio of OCNG DMRS	OCNG to						
Ês		dBm/S CS	Config 1	-87	-87	-Infinity	-87
SSB_RP Note 3		dBm/S CS Note5	Config 1	-87	-87	-Infinity	-87
$\hat{E}_{_{ m S}}/I_{_{ m ot}}$ BB Note 8	3	dB	Config 1	1.89	1.89	-Infinity	1.89
lo <sup>Note3</sup>		dBm/95 .04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01
Propagation Co	ondition		Config 1	Δ۱۸	I /GN	Δ	WGN
Propagation Condition		Ī	Coming i	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:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
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
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor $\Delta MB_S$ from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.7.6.2.1.2 Test Requirements

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.

The 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

#### A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 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 on	Test 1	Test 2			
NR RF Channel Number		Config 1	1, 2		Two FR2 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	13		As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1	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	DRX.1	DRX.7	As specified in clause A.3.3		
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.		
T1	s	Config 1	5				
T2	S	Config 1	8 for PC1; 82 for PC1; 5 for other PC 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

Para	meter	Unit	Test	Ce	Cell 1		Cell 2
			configuratio	T1	T2	T1	T2
			n				
AoA setup			Config 1	Setu	p 1 as specif	ied in claus	e A.3.15
Beam Assump	tion <sup>Note 7</sup>		Config 1	Rough			
NR RF Channe	el Number		Config 1	1 2			2
TDD configura	tion		Config 1	TDDC	TDDConf.3.1		Conf.3.1
Duplex mode			Config 1	TI	TDD		TDD
BW <sub>channel</sub>		MHz	Config 1	100: N	RB,c = 66	100: N <sub>RB,c</sub> = 66	
Data RBs alloc	ated		Config 1	6	66		66
BWP BW	•	MHz	Config 1	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66	
BWP configuration	Initial DL BWP		Config 1	DLBV	VP.0.1	N/A	

F					1	
Initial UL BWP			ULBV	VP.0.1	1	N/A
Dedicated DL BWP			DLBV	VP.1.1	1	N/A
Dedicated UL BWP			ULBV	VP.1.1	1	N/A
OCNG Patterns defined in A.3.2.1.1		Config 1	OP.1		С	)P.1
PDSCH Reference measurement channel		Config 1	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1	CR.3.	1 TDD		-
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SM	TC.1	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	1:	20	1	120
TRS configuration		Config 1	TRS.2	.1 TDD	1	N/A
PDSCH/PDCCH TCI state		Config 1	TCI.S	State.2	1	N/A
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS			0		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 <sub>oc</sub> Note2	dBm/15 kHz Note5		-10	)4.7	-1	04.7
N <sub>oc</sub> Note2	dBm/S CS Note4	Config 1	-9	5.7	-{	95.7
SSB_RP Note 3	dBm/S CS Note5	Config 1	-89.7 -89.7		-Infinity	-86.7
$\hat{E}_s/I_{ot}$	dB	Config 1	6	6	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1	6	6	-Infinity	9
Io <sup>Note3</sup>	dBm/95 .04	Config 1	-59.7	-59.7	-66.7	-57.2
	MHz Note5					
Propagation Condition		Config 1	AW	/GN	AV	VGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be
	fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

As observed with 0 dBi gain antenna at the centre of the quiet zone

### A.7.6.2.2.2 Test Requirements

test system implementation

Note 6:

Note 7:

In test 1 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

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 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 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<sub>DCCH</sub> 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.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 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 configurati on	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 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	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between		Config 1	3μs	Synchronous cells.
serving and neighbour				
cells				
T1	S	Config 1	5	
T2	s	Config 1	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter		Unit	Test	Ce	ell 1	Cell 2	
			configuratio n	T1	T2	T1	T2
AoA setup			Config 1	Setu	ıp 3 as specit	fied in claus	e A.3.15
			 	Ad	oA1		AoA2
Beam Assump	tion <sup>Note 7</sup>		Config 1	Ro	ough	F	Rough
NR RF Channe	el Number		Config 1	1		2	
Duplex mode			Config 1	TDD		TDD	
TDD configura	tion		Config 1	TDDConf.3.1		TDDConf.3.1	
BW <sub>channel</sub>		MHz	Config 1	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66	
Data RBs alloc	ated		Config 1	66		66	
BWP BW		MHz	Config 1	100: N <sub>RB,c</sub> = 66		100: N <sub>RB,c</sub> = 66	
BWP configuration	Initial DL BWP			DLBWP.0.1			N/A
	Initial UL BWP		Config 1	ULBWP.0.1		N/A	
	Dedicated DL BWP			DLB\	WP.1.1		N/A

Dedicated UL BWP			ULBW	/P.1.1	N	I/A	
OCNG Patterns defined in A.3.2.1.1		Config 1	0.0	OP.1		OP.1	
_			SR.3.1 TDD		U	P. I	
PDSCH Reference measurement channel		Config 1	SR.3.	1 וטט		-	
CORESET Reference Channel		Config 1	CR.3.	CR.3.1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMT	ΓC.1	SM	TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	12	20	1	20	
TRS configuration		Config 1	TRS.2	.1 TDD	N	I/A	
PDSCH/PDCCH TCI state		Config 1		tate.2		I/A	
EPRE ratio of PSS to SSS		J					
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1		)	0		
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)							
Ês	dBm/S CS	Config 1	-87	-87	-Infinity	-87	
SSB_RP Note 3	dBm/S CS Note5	Config 1	-87	-87	-Infinity	-87	
$\hat{\mathrm{E}}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note 8	dB	Config 1	1.89	1.89	-Infinity	1.89	
O Note3	dBm/95 .04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01	
Propagation Condition Config 1 AWGN					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: Void
- Note 3: SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- 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
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 8: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB<sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.7.6.2.3.2 Test Requirements

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.

The 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<sub>DCCH</sub> 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 # 13 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

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	Test Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1, 2		Two FR2 NR carrier frequencies is
Active cell		Config 1	NR cell 1 (Pce	II)	used.  NR Cell 1 is on NR RF channel
7101170 0011		Corning 1	1411 0011 1 (1 00	,	number 1.

Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel
					number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	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	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between		Config 1	3µs		Synchronous cells.
serving and neighbour					
cells					
T1	S	Config 1	5		
T2	S	Config 1	11 for PC1;	108 for PC1;	
			6.5 for other	67 for other	
			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

Para	meter	Unit	Test	Се	II 1		Cell 2		
			configuratio n	T1	T2	T1	T2		
AoA setup			Config 1	Setu	Setup 1 as specified in clause A.3.15				
Beam Assump	tion <sup>Note 7</sup>		Config 1		Ro	ough			
NR RF Channe	el Number		Config 1		1		2		
Duplex mode			Config 1	TI	DD		TDD		
TDD configura	tion		Config 1	TDDC	onf.3.1		Conf.3.1		
BW <sub>channel</sub>		MHz	Config 1	100: N	RB,c = 66	100:	$N_{RB,c} = 66$		
Data RBs alloc	cated		Config 1	6	6		66		
BWP BW		MHz	Config 1	100: N	RB,c = 66	100:	$N_{RB,c} = 66$		
BWP configuration	Initial DL BWP			DLBV	/P.0.1		N/A		
	Initial UL BWP		Confin 4	ULBWP.0.1		N/A			
	Dedicated DL BWP		Config 1	DLBV	/P.1.1		N/A		
	Dedicated UL BWP			ULBV	/P.1.1		N/A		
OCNG Pattern A.3.2.1.1	s defined in		Config 1	OP.1		OP.1			
PDSCH Reference			Config 1	SR.3.1 TDD			-		
CORESET Re Channel	ference		Config 1	CR.3.1 TDD			-		
SMTC configuin A.3.11.1 and			Config 1	SMTC.1		SI	MTC.1		
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120			
TRS configuration			Config 1	TRS.2	.1 TDD		N/A		
PDSCH/PDCCH TCI state			Config 1	TCI.State.2			N/A		
EPRE ratio of			•						
EPRE ratio of to SSS	PBCH DMRS		Config 1		)		0		

EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
$N_{oc}^{ m Note2}$	dBm/15 kHz Note5		-10	04.7	-1	04.7	
N <sub>oc</sub> Note2	dBm/S CS Note4	Config 1	-9	5.7	-9	95.7	
SSB_RP Note 3	dBm/S CS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7	
$\hat{E}_s/I_{ot}$	dB	Config 1	6	6	-Infinity	9	
$\hat{E}_s/N_{oc}$	dB	Config 1	6	6	-Infinity	9	
Io <sup>Note3</sup>	dBm/95 .04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2	
Propagation Condition		Config 1		/GN		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.
- 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.
- Note 3: SSB\_RP and 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 Note 6:
- Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or Note 7: test system implementation

#### A.7.6.2.4.2 **Test Requirements**

In test 1 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 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 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<sub>DCCH</sub> 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 per-UE 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 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

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	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency 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	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
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
		Config 1	TRS.1.1 FDD		

CSI-RS for tracking		Config 2	TRS.1.1 TDD		
parameters on NR RF Channel 1		Config 3	TRS.1.2 TDD		
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	-105		
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	5.2 for PC1; 3.5 for other PC	3 for PC1; 2 for other PC	

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Ce	ell 1	C	Cell 2	
			configuratio n	T1 T2		T1	T2	
AoA setup			Config 1,2,3	N/A			Setup 1 as specified in clause A.3.15	
Beam Assump	otion <sup>Note 7</sup>		Config 1,2,3	N	/A	R	ough	
NR RF Chann	el Number		Config 1,2,3		1		2	
Duplex mode			Config 1	FI	OD	-	ΓDD	
			Config 2,3	TI	DD	-	ΓDD	
TDD configura	tion		Config 1	Not Ap	plicable	TDD	Conf.3.1	
			Config 2	TDDC	onf.1.1	TDD	Conf.3.1	
			Config 3	TDDC	onf.2.1	TDD	Conf.3.1	
BW <sub>channel</sub>		MHz	Config 1	10: N <sub>R</sub>	<sub>B,c</sub> = 52	100:1	$N_{RB,c} = 66$	
			Config 2	10: N <sub>R</sub>	в,с = 52	100: N <sub>RB,c</sub> = 66		
			Config 3	40: N <sub>RB,c</sub> = 106		100: N <sub>RB,c</sub> = 66		
Data RBs alloc	cated		Config 1	52			66	
			Config 2	52			66	
			Config 3	106		66		
BWP BW		MHz	Config 1	10: N <sub>RB,c</sub> = 52		100: 1	$N_{RB,c} = 66$	
			Config 2	10: $N_{RB,c} = 52$			$N_{RB,c} = 66$	
			Config 3	40: N <sub>RE</sub>	s,c = 106	100:1	$N_{RB,c} = 66$	
BWP configuration	Initial DL BWP			DLBV	VP.0.1		N/A	
	Initial UL BWP		Config 1 2 2	ULBV	VP.0.1		N/A	
Dedicated DL BWP			Config 1,2,3	DLBWP.1.1		N/A		
	Dedicated UL BWP	_		ULBV	VP.1.1		N/A	
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OI	P.1		DP.1	
PDSCH Refer	ence		Config 1	SR.1.	1 FDD		-	
measurement	channel		Config 2	SR.1.	1 TDD	<u> </u>		

	ı				
		Config 3	SR2.1 TDD		
RMSI CORESET Reference		Config 1	CR.1.1 FDD		-
Channel		Config 2	CR.1.1 TDD		
		Config 3	CR2.1 TDD		
Dedicated CORESET RMC configuration		Config 1	CCR.1.1 FDD		-
		Config 2	CCR.1.1 TDD		
		Config 3	CCR.2.1 TDD		
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.2	SM	ITC.2
		Config 2,3	SMTC.1	SM	ITC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2	15	1	20
spacing		Config 3	30	1	20
EPRE ratio of PSS to SSS		Config 1,2,3	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)					
Ês	dBm/S CS	Config 1,2,3		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2		-Infinity	-87
$\hat{E}_{s}/I_{ot}_{BB}$ Note 8	dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
Io <sup>Note3</sup>	dBm/95 .04 MHz	Config 1,2,3	A.3.7A	-Infinity	-58.01
Department Constitution	Note5	Confic 4 0 0		A.1	MONI
Propagation Condition  Note 1: OCNG shall be used		Config 1,2,3			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: SSB\_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

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

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 8: Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

#### A.7.6.2.5.2 Test Requirements

In test 1, with per-UE, 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 2, without the 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

2560 for UE supporting power class 1, or

1600 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<sub>DCCH</sub> 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 per-UE 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 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

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	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati on	Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2			•	One NR FR1 and one NR FR2 carrier frequency 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		Gap n		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
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
CSI-RS for tracking		Config 1	TRS.1	.1 FDD			·
parameters on NR RF		Config 2	TRS.1	.1 TDD			
Channel 1		Config 3		.2 TDD			
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	-105				
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 .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms	ı	ı	•	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		Cell 2	
		configuratio	T1 T2		T1	T2
		n				
AoA setup		Config 1,2,3	N	IA	Setup 1 as specified in	
					clause A.3.15	
Beam AssumptionNote 7		Config 1,2,3	N/A		Rough	
NR RF Channel Number		Config 1,2,3	1		2	
Duplex mode		Config 1	FDD		TDD	
		Config 2,3	TI	OD		ΓDD

TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1	
TOO COIIIIgula	uon		Config 1	TDDConf.1.1	TDDConf.3.1	
			Config 3	TDDConf.2.1	TDDConf.3.1	
BW <sub>channel</sub>		MHz	Config 1	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
DVVCIIailliei		1711 12	Config 2	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
			Config 3	40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66	
Data RBs alloc	ated		Config 1	52	66	
Bata NBo alloc	alou		Config 2	52	66	
			Config 3	106	66	
BWP BW		MHz	Config 1	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
2 2			Config 2	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
			Config 3	40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66	
BWP	Initial DL			DLBWP.0.1	N/A	
configuration	BWP					
3	Initial UL					
	BWP		0 " 100	ULBWP.0.1	N/A	
	Dedicated DL		Config 1,2,3	DLBWP.1.1	N/A	
	BWP					
	Dedicated UL			LIL DIA/D 4.4	NI/A	
	BWP			ULBWP.1.1	N/A	
OCNG Pattern	s defined in		Config 1,2,3			
A.3.2.1.1 (OP.	1)			OP.1	OP.1	
PDSCH Refere	ence		Config 1	SR.1.1 FDD	-	
measurement of	channel		Config 2	SR.1.1 TDD		
				SR2.1 TDD	1	
DMCI CODECI	DMOLOODEOET D. (		Config 3			
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD	-	
Channel			Config 2	CR.1.1 TDD	-	
Dadiastad COI	DECET DMC		Config 3 Config 1	CR2.1 TDD CCR.1.1 FDD	-	
	Dedicated CORESET RMC configuration		Coning i	CCR.1.1 FDD	-	
Corniguration			0 " 0	000 4 4 700		
			Config 2	CCR.1.1 TDD		
			0 " 0	000 0 4 700		
			Config 3	CCR.2.1 TDD		
SMTC configur	ration defined					
in A.3.11.1 and			Config 1	SMTC.2	SMTC.2	
11174.0.111.1 dile	77.0.11.2					
			Config 2,3	SMTC.1	SMTC.1	
DD00LL/DD00	d t a colo a a suel a s	1.1.1-	_	45	100	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120	
spacing	Dec +0 ecc		Config 3	30	120	
EPRE ratio of I						
EPRE ratio of I	PBCH DMRS					
to SSS						
	PBCH to PBCH					
DMRS						
	EPRE ratio of PDCCH DMRS					
to SSS						
EPRE ratio of PDCCH to			Config 4 0 0	_		
PDCCH DMRS			Config 1,2,3	0	0	
EPRE ratio of PDSCH DMRS						
to SSS						
EPRE ratio of PDSCH to						
PDSCH			_			
EPRE ratio of (						
to SSS(Note 1)			4			
EPRE ratio of (						
OCNG DMRS	(Note 1)					

$N_{oc}^{ m Note2}$	dBm/15 kHz			-1	04.7
	Note5				
$N_{oc}^{\text{Note2}}$	dBm/S	Config 1,2		-(	95.7
· oc	CS	Config 3	]	-(	95.7
	Note4	3			
SSB_RP Note 3	dBm/S	Config 1,2		-Infinity	-86.7
	CS	Config 3	]	-Infinity	-86.7
	Note5			-	
$\hat{E}_{s}/I_{ot}$	dB	Config 1,2,3	NA Link ank and aloue	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	Link only, see clause A.3.7A	-Infinity	9
Io <sup>Note3</sup>	dBm/9. 36MHz	Config 1,2		-	-
	dBm/38 .16MHz	Config 3		-	-
	dBm/95	Config 1,2,3		-66.7	-57.2
	.04				
	MHz				
	Note5				
Propagation Condition		Config 1,2,3		A۱	VGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled
- Note 3: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB\_RP 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
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

### A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

#### A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE 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 no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

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 U	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		One NR FR1 and one NR FR2 carrier frequency 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	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
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
CSI-RS for tracking		Config 1	TRS.1.1 FDD		
parameters on NR RF		Config 2	TRS.1.1 TDD		
Channel 1		Config 3	TRS.1.2 TDD		
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	-105		

CP length		Config 1,2,3	Normal				
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0		L3 filtering is not used		
DRX		Config 1,2,3	OFF		DRX is not used		
Time offset between serving and neighbour cells		Config 1	3ms		3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs		Synchronous cells.		
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	7 for PC1; 4.5 for other PC	3.5 for PC1; 2.5 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	ell 1	C	Cell 2	
			configuratio n	T1	T2	T1	T2	
AoA setup	AoA setup		Config 1,2,3	1	NΑ		Setup 1 as specified in	
D A	C - Note 7		0		1/4		e A.3.15	
Beam Assump			Config 1,2,3	Ŋ	I/A	R	ough	
NR RF Channe	el Number		Config 1,2,3		1		2	
Duplex mode			Config 1		DD		ΓDD	
			Config 2,3	Т	DD		ΓDD	
TDD configura	tion		Config 1	Not Ap	plicable	TDD	Conf.3.1	
			Config 2	TDDC	Conf.1.1	TDD	Conf.3.1	
			Config 3	TDDC	Conf.2.1	TDD	Conf.3.1	
BW <sub>channel</sub>		MHz	Config 1		RB,c = 52	100: 1	$N_{RB,c} = 66$	
			Config 2		RB,c = 52		$N_{RB,c} = 66$	
			Config 3	40: N <sub>R</sub>	B,c = 106	100: 1	N <sub>RB,c</sub> = 66	
Data RBs alloc	ated		Config 1	;	52		66	
			Config 2		52		66	
			Config 3		06		66	
BWP BW		MHz	Config 1	10: N <sub>F</sub>	RB,c = 52		$N_{RB,c} = 66$	
			Config 2		RB,c = 52		$N_{RB,c} = 66$	
			Config 3	40: $N_{RB,c} = 106$		100: N <sub>RB,c</sub> = 66		
BWP configuration	Initial DL BWP			DLB\	WP.0.1		N/A	
	Initial UL BWP		Config 1,2,3	ULB\	WP.0.1		N/A	
	Dedicated DL BWP		Coming 1,2,3	DLB\	WP.1.1		N/A	
	Dedicated UL BWP			ULB\	WP.1.1		N/A	
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	0	P.1		)P.1	
PDSCH Refere			Config 1	SR.1	.1 FDD		-	
measurement	measurement channel		Config 2	SR.1	.1 TDD			
			Config 3		1 TDD	1		
RMSI CORESI	ET Reference		Config 1		.1 FDD		-	
Channel	<del>-</del>		Config 2		.1 TDD	1		
			Config 3		1 TDD	1		
Dedicated COI configuration	RESET RMC		Config 1		1.1 FDD		-	

		Config 2	CCR.1.1 TDD	Ī	
		Cornig 2	CCR.1.1 TDD		
		Config 3	CCR.2.1 TDD		
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.2	SM	ITC.2
		Config 2,3	SMTC.1	SM	ITC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2	15		20
spacing		Config 3	30	1	20
EPRE ratio of PSS to SSS		Config 1,2,3	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)					
Ês	dBm/S CS	Config 1,2, 3		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2		-Infinity	-87
	Notes	Config 3		-Infinity	-87
$\hat{E}_s/I_{ot}$ BB Note 8	dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
Io <sup>Note3</sup>	dBm/95 .04	Config 1,2,3	A.3.7A	Infinity	-58.01
	MHz Note5				
Propagation Condition	NOTES	Config 1,2,3		ΑV	VGN
	such that h		y allocated and a consta		

Note 1: OCNG shall be 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: SSB\_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 8:

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

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Calculation of Es/lot<sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor  $\Delta$ MB<sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

### A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than 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 2 without the 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

3360 for UE supporting power class 1, or

2080 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<sub>DCCH</sub> 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 per-UE 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 no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap , it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain 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	Value	Comment

	configurati	1	2	Test 3	Test 4	
	configurati on	•		3	-	
	Config 1,2,3	1, 2	1	l .		One NR FR1 and one NR FR2
						carrier frequency is used.
	Config 1,2,3	NR ce	ll 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
	Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
	Config 1,2,3	0				As specified in clause 9.1.2-1.
	Config 1,2,3	39		N/A		
	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
	Config 1	TRS.1	.1 FDD			
	Config 2	TRS.1	.1 TDD			
	Config 3	TRS.1	.2 TDD			
	Config 1,2,3	SSB.3	FR2			As specified in clause A.3.10.2
dB	Config 1,2,3	6				
dB	Config 1,2,3	0				
dBm	Config 1,2,3	-105				
	Config 1,2,3	Norma	al			
S	Config 1,2,3	0				
	Config 1,2,3					L3 filtering is not used
	Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
	Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
	Config 2,3	3µs				Synchronous cells.
S	Config 1,2,3	5				
S	Config 1,2,3	11 for PC1; 6.5 for othe r PCT	108 for PC1; 67 for othe r PCT	for PC1; 6.5 for othe r PCT	108 for PC1; 67 for other PCT BD	
	dB dBm s	Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1  Config 2  Config 3  Config 1  Config 2  Config 3  Config 1  Config 2  Config 3  Config 1,2,3  dB Config 1,2,3  dB Config 1,2,3  dB Config 1,2,3  config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3  Config 1,2,3	Config 1,2,3 NR ce  Config 1,2,3 NR ce  Config 1,2,3 0  Config 1,2,3 39  Config 1  Config 2  SSB.1  Config 3  Config 3  Config 1  Config 2  TRS.1  Config 3  TRS.1  Config 3  Config 1,2,3 6  dB Config 1,2,3 6  dB Config 1,2,3 0  dBm Config 1,2,3 0  Config 1,2,3 Norma  S Config 1,2,3 0  Config 1,2,3 0  Config 1,2,3 0  Config 1,2,3 0  Config 1,2,3 0  Config 1,2,3 1  Config 1,2,3 1  Config 1  S Config 1,2,3 5  Config 1,2,3 5  S Config 1,2,3 5  S Config 1,2,3 5  S Config 1,2,3 5  S Config 1,2,3 11  for PC1; 6.5  for othe  r	Config 1,2,3   NR cell 1 (Pcell   Config 1,2,3   NR cell 2	Config 1,2,3   NR cell 1 (Pcell)	Config 1,2,3   NR cell 1 (Pcell)

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Cell 1		С	ell 2
		configuratio	T1	T2	T1	T2
AoA setup		Config 1,2,3	NA		Setup 1 as specified in clause A.3.15	
Beam AssumptionNote 7		Config 1,2,3	N/A		Rough	
NR RF Channel Number		Config 1,2,3	1		2	
Duplex mode		Config 1	FDD		7	ΓDD
		Config 2,3	TDD		TDD	
TDD configuration		Config 1	Not Applicable		TDD	Conf.3.1
		Config 2	TDDC	onf.1.1	TDDConf.3.1	

			Config 3	TDDConf.2.1	TDDConf.3.1
BW <sub>channel</sub>		MHz	Config 1	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66
			Config 2	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66
			Config 3	40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66
Data RBs alloc	ated		Config 1	52	66
			Config 2	52	66
			Config 3	106	66
BWP BW		MHz	Config 1	10: N <sub>RB,c</sub> = 52	100: $N_{RB,c} = 66$
			Config 2	10: N <sub>RB,c</sub> = 52	100: $N_{RB,c} = 66$
			Config 3	40: N <sub>RB,c</sub> = 106	100: N <sub>RB,c</sub> = 66
BWP configuration	Initial DL BWP			DLBWP.0.1	N/A
	Initial UL BWP		Config 1,2,3	ULBWP.0.1	N/A
	Dedicated DL BWP		Corning 1,2,3	DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1	OP.1
PDSCH Refere	ence		Config 1	SR.1.1 FDD	-
measurement	channel		Config 2	SR.1.1 TDD	
			Config 3	SR2.1 TDD	
RMSI CORES	FT Reference		Config 1	CR.1.1 FDD	
Channel			Config 2	CR.1.1 TDD	
			Config 3	CR2.1 TDD	
Dedicated COI configuration	Dedicated CORESET RMC		Config 1	CCR.1.1 FDD	-
· ·			Config 2	CCR.1.1 TDD	
			Config 3	CCR.2.1 TDD	
SMTC configur			Config 1	SMTC.2	SMTC.2
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing			Config 3	30	120
EPRE ratio of l	PSS to SSS		<u> </u>		
EPRE ratio of I	PBCH DMRS				
	PBCH to PBCH				
	PDCCH DMRS				
EPRE ratio of PDCCH DMRS			Config 1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of I	PDSCH to				
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG DMRS	OCNG to				
$N_{oc}$ Note2	·	dBm/15		NA	-104.7
· oc		kHz		Link only, see clause	
		Note5		A.3.7A	

$N_{oc}$ Note2	dBm/S	Config 1,2	-:	95.7
TV <sub>oc</sub> Note	CS	Config 3	-:	95.7
	Note4	_		
SSB_RP Note 3	dBm/S	Config 1,2	-Infinity	-86.7
	CS	Config 3	-Infinity	-86.7
	Note5	· ·	•	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2,3	-Infinity	9
$\hat{E}_s/N_{oc}$	dB	Config 1,2,3	-Infinity	9
Io <sup>Note3</sup>	dBm/9.	Config 1,2	-	-
	36MHz	<b>3</b>		
	dBm/38	Config 3	-	-
	.16MHz	_		
	dBm/95	Config 1,2,3	-66.7	-57.2
	.04			
	MHz			
	Note5			
Propagation Condition		Config 1,2,3	A۱	WGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 3: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB\_RP 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
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

### A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

## A.7.6.3 L1-RSRP measurement for beam reporting

## A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

### A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

## A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW <sub>channel</sub>	1~2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1		SR.3.2 TDD
	2		SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
	2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
	2		CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2
OOD configuration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD

PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	s	5
T2	1~2	S	2
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 <sup>Note 1</sup> EPRE ratio of OCNG to OCNG  DMRS Note 1	1~2	dB	0
Propagation condition	1~2		AWGN
11 1 1 2 2 2 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.

Table A.7.6.3.1.2-2: SSB specific test parameters

Doromotor	Confin	Unit	SS	B#0	SSI	3#1
Parameter	Config	Offic	T1	T2	T1	T2
Angle of arrival configuration			Set	up 1 accord	ding to A.3.	15.1
Beam Assumption <sup>Note 4</sup>	1-2			Ro	ugh	
$N_{oc}^{ m Note2}$	1~2	dBm/15kHz		-1	05	
M Note2	1	dBm/SSB SCS	-96			
$N_{oc}^{ m Note2}$	2		-93			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	0	-Infinity	9
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
OOD_IXI	2		-93	-93	-Infinity	-84
I Note2	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
Io Note3	2		-63.97	-63.97	-66.98	-57.47
$\hat{E}_s/N_{oc}$	1~2	dB	0	0	-Infinity	9

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: SSB\_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

### A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

#### A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config Description			
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	equired to be tested in one of the supported test configurations		

## A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~2		66
PDSCH Reference	1		SR.3.2 TDD
measurement channel	2		SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD
Channel	2		CR.3.2 TDD

Dedicated CORESET Reference Channel   2				
SSB configuration	Dedicated CORESET	1		CCR.3.1 TDD
SSB configuration   2	Reference Channel	2		CCR.3.7 TDD
CCNG Patterns	SSB configuration	1		SSB.1 FR2
Initial BWP Configuration  Dedicated BWP configuration  Dedicated BWP configuration  1~2  DLBWP.0.1  DLBWP.0.1  DLBWP.0.3  DLBWP.1.3  ULBWP.1.3  ULBWP.1.3  SMTC configuration  1~2  SMTC.1  TRS Configuration  1~2  TRS.2.1 TDD  PDCCH/PDSCH TCI  Configuration  DRX configuration  1~2  DRX.3  reportConfigType  1~2  DRX.3  reportConfigType  1~2  DRX.3  reportQuantity  1~2  Ssb-Index-RSRP  Number of reported RS  1~2  L1-RSRP reporting period  1~2  Ssb-Index-RSRP  T2  L1-RSRP reporting period  1~2  Ssb-Index-RSRP  T2  L1-RSRP reporting period  1~2  Ssb-Index-RSRP  T2  Ssb-Index-RSRP  T2  Ssb-Index-RSRP  T2  Ssb-Index-RSRP  T-2  Ssb-Index-RSRP  T-2  ABB  O  DRS SSB-EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDCCH  DMRS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to OCNG  DMRS Note 1  Propagation condition  1~2  AWGN	SSB configuration	2		SSB.2 FR2
Initial BWP Configuration	OCNG Patterns	1~2		OP.1
Dedicated BWP configuration  SMTC configuration  TRS Configuration  TRS Configuration  TRS Configuration  TRS Configuration  PDCCH/PDSCH TCI Configuration  DRX configuration  DRX configuration  TCI.State.2  DRX.3  reportConfigType  1~2  periodic  reportQuantity  1~2  DRX.3  reportQuantity  1~2  DRX.3  reportConfigType  1~2  periodic  reportQuantity  1~2  Ssb-Index-RSRP  Number of reported RS  1~2  L1-RSRP reporting period  1~2  Slot  320  T1  1~2  S 5  T2  1~2  S 5  T2  EPRE ratio of PSS to SSS  EPRE ratio of PSCH 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 PDSCH DMRS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  1~2  AWGN	Initial PMP Configuration	1.2		DLBWP.0.1
Dedicated BWP configuration   1~2	Illidal BVVF Corlingulation	1~2		ULBWP.0.1
SMTC configuration 1~2 SMTC.1  TRS Configuration 1~2 TRS.2.1 TDD  PDCCH/PDSCH TCI Configuration 1~2 TCI.State.2  DRX configuration 1~2 DRX.3  reportConfigType 1~2 periodic  reportQuantity 1~2 ssb-Index-RSRP  Number of reported RS 1~2 2  L1-RSRP reporting period 1~2 slot 320  T1 1~2 s 5  T2 1~2 s 5  EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH 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 PDCCH 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 PDCCH DMRS to SSS  EPRE ratio of CONG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio OCNG DMRS to SSS  EPRE ratio O	Dedicated BWP configuration	12		DLBWP.1.3
TRS Configuration         1~2         TRS.2.1 TDD           PDCCH/PDSCH TCI         1~2         TCI.State.2           Configuration         1~2         DRX.3           reportConfigType         1~2         periodic           reportQuantity         1~2         ssb-Index-RSRP           Number of reported RS         1~2         2           L1-RSRP reporting period         1~2         slot         320           T1         1~2         s         5           T2         1~2         s         3           EPRE ratio of PSS to SSS         EPRE ratio of PBCH DMRS to SSS         EPRE ratio of PBCH DMRS to SSS           EPRE ratio of PDCCH to PDCCH DMRS         SSS         EPRE ratio of PDSCH to PDSCH DMRS to SSS           EPRE ratio of PDSCH to PDSCH DMRS to SSS (SS)         EPRE ratio of OCNG DMRS to SSS (SS)         EPRE ratio of OCNG DMRS to SSS (SS)           EPRE ratio of OCNG to OCNG DMRS to SSS (SS)         EPRE ratio of OCNG to OCNG DMRS to SSS (SS)         AWGN	Dedicated BWF configuration	1~2		ULBWP.1.3
PDCCH/PDSCH TCI         1~2         TCI.State.2           Configuration         1~2         DRX.3           reportConfigType         1~2         periodic           reportQuantity         1~2         ssb-Index-RSRP           Number of reported RS         1~2         2           L1-RSRP reporting period         1~2         slot         320           T1         1~2         s         5           T2         1~2         s         3           EPRE ratio of PSS to SSS         EPRE ratio of PBCH DMRS to SSS         EPRE ratio of PBCH bMRS to SSS           EPRE ratio of PDCCH DMRS to SSS         EPRE ratio of PDCCH bMRS to SSS         EPRE ratio of PDSCH to PDSCH DMRS           EPRE ratio of OCNG DMRS to SSSNote 1         EPRE ratio of OCNG DMRS to SSSNote 1         AWGN           EPRE ratio of OCNG to OCNG DMRS Note 1         AWGN				SMTC.1
Configuration		1~2		TRS.2.1 TDD
DRX configuration  DRX configuration  reportConfigType  1~2  periodic  reportQuantity  1~2  ssb-Index-RSRP  Number of reported RS  1~2  L1-RSRP reporting period  1~2  slot  320  T1  1~2  s 5  T2  1~2  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 PDCCH 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 PDCCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of CONG DMRS to SSS  EPRE ratio of CONG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of PBC	PDCCH/PDSCH TCI	12		TCI State 2
reportConfigType         1~2         periodic           reportQuantity         1~2         ssb-Index-RSRP           Number of reported RS         1~2         2           L1-RSRP reporting period         1~2         slot         320           T1         1~2         s         5           T2         1~2         s         3           EPRE ratio of PSS to SSS         EPRE ratio of PBCH DMRS to SSS         EPRE ratio of PBCH DMRS to SSS         EPRE ratio of PDCCH DMRS to SSS           EPRE ratio of PDCCH to PDCCH DMRS         1~2         dB         0           EPRE ratio of PDSCH to PDSCH DMRS to SSSNote 1         EPRE ratio of OCNG DMRS to SSNote 1         The propagation condition         AWGN		1~2		TOI.State.2
reportQuantity 1~2 ssb-Index-RSRP  Number of reported RS 1~2 2  L1-RSRP reporting period 1~2 slot 320  T1 1~2 s 5  T2 1~2 s 5  EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  AWGN				DRX.3
Number of reported RS	reportConfigType			periodic
L1-RSRP reporting period		1~2		ssb-Index-RSRP
T1	Number of reported RS	1~2		2
T2	L1-RSRP reporting period	1~2	slot	320
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  DMRS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of P	T1	1~2	S	
EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  DMRS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of DMRS to SSS  EPRE ratio of OCNG DMRS to SSS  EPRE	T2	1~2	S	3
EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  DMRS  EPRE ratio of OCNG DMRS to  SSSNote 1  EPRE ratio of OCNG to OCNG  DMRS Note 1  Propagation condition  1~2  AWGN				
EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH  DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH  DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG  DMRS Note 1  Propagation condition  1~2  AWGN				
EPRE ratio of PDCCH to PDCCH DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  1~2  AWGN				
DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition  1~2  dB 0  AWGN				
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  Propagation condition  1~2  dB 0  AWGN				
EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup> EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition 1~2  AWGN		1~2	dВ	0
DMRS  EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup> EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition 1~2 AWGN		' -	ub.	· ·
SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1  Propagation condition 1~2  AWGN				
EPRE ratio of OCNG to OCNG  DMRS Note 1  Propagation condition 1~2  AWGN		1		
DMRS Note 1 Propagation condition 1~2 AWGN				
Propagation condition 1~2 AWGN				
· · · · · · · · · · · · · · · · · · ·		1.2		AVA/CNI
			manaumana ira Ca	

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.7.6.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	SSB#0		SSB#1	
Parameter	Config	Unit	T1	T2	T1	T2	
Angle of arrival configuration			Set	up 1 accord	ding to A.3.	15.1	
Beam Assumption <sup>Note 4</sup>	1-2			Ro	ugh		
$N_{oc}^{ m Note2}$	1~2	dBm/15kHz		-105			
Note2	1	dBm/SSB SCS	-96				
IV <sub>oc</sub>	2		-93		93		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	0	-Infinity	9	
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87	
000_111	2		-93	-93	-Infinity	-84	
I Note?	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47	
lo <sup>Note3</sup>	2		-63.97	-63.97	-66.98	-57.47	

$\hat{E}_s/N_{oc}$							9
Note 1:	3						
	T2.						
Note 2:	Interfere	nce from other o	ells and noise sources no	t specified	in the test i	s 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:	SSB RP	and lo levels ha	ave been derived from oth	er paramet	ters for info	rmation pu	rposes.
			rameters themselves.	.о. разалто			
Note 4	•	•		2 4 2 0 0 4 6	daaa sat Iis	:4 I I I	
Note 4:		71	of UE beam is given in B.2	د. ۱.ع, and c	ioes not iim	III UE	
	implementation or test system implementation						

#### A.7.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

### A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

## A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N <sub>RB,c</sub> = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		Off
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS  EPRE ratio of PBCH DMRS to SSS  EPRE ratio of PBCH to PBCH DMRS  EPRE ratio of PDCCH DMRS to SSS  EPRE ratio of PDCCH to PDCCH			
DMRS  EPRE ratio of PDSCH DMRS to SSS  EPRE ratio of PDSCH to PDSCH DMRS  EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup> EPRE ratio of OCNG to OCNG	1	dB	0
DMRS Note 1			0-114 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.7.6.3.3.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
Angle of arrival configuration	1		Setup 1 accord	ling to A.3.15.1
Beam Assumption <sup>Note 4</sup>	1		Rough	

$N_{oc}^{ m Note1}$	1	dBm/15kHz	-105		
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1	dB	0	9	
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97 -86.97		
lo <sup>Note2</sup>	1	dBm/95.04MHz	-63.97	-57.47	
$\hat{E}_s/N_{oc}$	1	dB	0	9	

Note 2: Interference from other cells and noise sources not specified in the test is 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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

## A.7.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 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.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	CSI-RS0	CSI-RS _RP0 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP0 + $\delta$ + G <sub>max</sub>		
	CSI-RS1	CSI-RS _RP1 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP1 + $\delta$ + G <sub>max</sub>		
Note 1:		e equivalent power received by an antenna with 0dBi gain at the centre of the quiet the test for the CSI-RS n under consideration		
Note 2:	ote 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test			
Note 3:				

The rate of correct events observed during repeated tests shall be at least 90%.

#### A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

## A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

Conf	ig	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note: The	UE is only re	equired to be tested in one of the supported test configurations

## A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N <sub>RB,c</sub> = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		DRX.3
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS	1	dB	0

EPRE ratio	of PDCCH to PDCCH			
EPRE ratio	of PDSCH DMRS to SSS			
EPRE ratio	of PDSCH to PDSCH			
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
	EPRE ratio of OCNG to OCNG			
DMRS Note 1	1			
Note 1:	OCNG shall be used s	such that the	resources i	n Cell 1 are fully
allocated and a consta		ant total trans	smitted pow	er spectral density is
	achieved for all OFDM		•	

Table A.7.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1		Setup 1 accord	ling to A.3.15.1		
Beam Assumption <sup>Note 4</sup>	1		Rou	ugh		
$N_{oc}^{ m Note1}$	1	dBm/15kHz	-105			
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1	dB	0	9		
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97		
lo <sup>Note2</sup>	1	dBm/95.04MHz	-63.97	-57.47		
$\hat{E}_s/N_{oc}$	1	dB	0	9		
		ells and noise sources no and time and shall be m				

Note 2: Interference from other cells and noise sources not specified in the test is 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.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

## A.7.6.3.4.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 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.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3				
CSI-RS0	CSI-RS _RP0 - $\delta$ + G <sub>min</sub> $\leq$ Reported RSRP(dBm) $\leq$ CSI-RS _RP0 + $\delta$ + G <sub>max</sub>				
CSI-RS1	CSI-RS _RP1 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 + $\delta$ + G <sub>max</sub>				

- Note 1: CSI-RS\_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration
- Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test
- Note 3: G<sub>min</sub> and G<sub>max</sub> are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class

The rate of correct events observed during repeated tests shall be at least 90%.

## A.7.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC\_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

## A.7.7.1 SS-RSRP

# A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

## A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

## A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	Unit	T1		T2	
	Oilit	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID		489	0	489	0
SSB ARFCN		fre	:q1	freq1	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
BW <sub>channel</sub>	MHz	100: N <sub>F</sub>	RB,c = 66	100: N	RB,c = 66

	T	_			
Data RBs allocated			4		4
Downlink initial BWP configuration		DLB WP.0. 1	-	DLB WP.0. 1	-
Downlink dedicated BWP configuration		DLB WP.1. 1	-	DLB WP.1. 1	-
Uplink initial BWP configuration		ULB WP.0. 1	-	ULB WP.0. 1	-
Uplink dedicated BWP configuration		ULB WP.1. 1	1	ULB WP.1. 1	1
DRX cycle configuration		Not applic able	1	Not applic able	ı
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. 2 TDD	-	SR.3. 2 TDD	1
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.3	OP.3	OP.3	OP.3
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 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 PDSCH_DMRS to SSS  EPRE ratio of PDSCH_DMRS to SSS  EPRE ratio of PDSCH to PDSCH_DMRS to SSS  EPRE ratio of PDSCH to PDSCH_DMRS  EPRE ratio of OCNG DMRS to SSSNote 1  EPRE ratio of OCNG to OCNG DMRS Note 1	dB	0	0	0	0
Propagation conditions		AWG N	AWG N	AWG N	AWG N
Antenna configuration		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:	Void
Note 3:	Void
Note 4:	Void
Note 5:	Void

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

D	4	11!4	T1		Т	2	
Parameter		Unit	Cell 1	Cell 2	Cell 1	Cell 2	
Angle of configura	ition		Setup	o 1 according	to clause A.3	3.15.1	
Assumpt UE beam	ion for ns <sup>Note 7</sup>		Ro	ugh	Rough		
$N_{\!oc}$ Note 1	l	dBm/15kH z <sup>Note4</sup>	-9	1.6	N	/A	
$N_{oc}$ Note 1		dBm/SCS Note4	-82	2.6	N	I/A	
$\hat{E}_s/N_{o}$	c	dB	6.0	1.0	N/A	N/A	
Es Es		dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
SSB_RPNote2		dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note6		dB	2.44	-5.98	-5.98	-5.98	
lo <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>	-50.05		(Table B.2.2-2 Rx Beam Peak +29.70dB)		
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{oc}$ to be							
Note 2:	for info	RP, Es/lot and rmation purpo					
Note 3: Note 4:							
Note 5: Note 6: Note 7:	Note 5: Void Calculation of Es/lot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB <sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.						
NOLE /.	II II OI II I	- :	es or or bea	iii is giveii III	الم. الم. م.الا	40 <del>6</del> 3 1101	

## A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

limit UE implementation or test system implementation

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

#### During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

#### During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	Cell 1	SSB_RP1 -δ +G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G <sub>max</sub>		
	Cell 2	SSB_RP2 - $\delta$ +G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP2 + $\delta$ +G <sub>max</sub>		
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zor configured in the test for the cell n under consideration			
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo used in the test			
Note 3:	G <sub>min</sub> and G <sub>max</sub> are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class		

# A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

#### A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
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	Test 1		Test 2	
		Onic	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	1~2		freq1	freq2	freq1	freq2
BWchannel	1~2		10 N <sub>RB,c</sub>		10 N <sub>RB,c</sub>	
	1			<u>- 00</u> 4	1 <b>1</b> RB,C	
Data RBs allocated	2		_	<u>.</u> 8	4	
Gap pattern ID			(		(	
Duplex mode	1~2		TD	DD	TD	)D
TDD configuration	1~2		TDDC	onf.3.1	TDDC	onf.3.1
PDSCH Reference	1		SR.3.2 TDD	_	SR.3.2 TDD	_
measurement channel	2		SR.3.3 TDD		SR.3.3 TDD	
RMSI CORESET	1		CR.3.2 TDD		CR.3.2 TDD	
Reference Channel	2		CR.3.2 TDD	-	CR.3.2 TDD	
Dedicated CORESET	1		CCR.3.1 TDD		CCR.3.1 TDD	
Reference Channel	2		CCR.3.7 TDD	-	CCR.3.7 TDD	-
SSB configuration	1		SSB.3	3 FR2	SSB.3	
	2		SSB.4	1 FR2	SSB.4	4 FR2
PDSCH/PDCCH subcarrier spacing	1~2	kHz	12	20	12	20
OCNG Patterns	1~2		OF		OP.3	
Initial BWP Configuration	1~2		DLBW ULBW	/P.0.1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~2		DLBW ULBW	-	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.S	tate.2	TCI.State.2	
SMTC configuration	1~2		SMT	TC.1	SMTC.1	
Time offset between Cell 2 and Cell 1	1~2	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 OCNG DMRS Note 1	1~2	dB	0	0	0	0
Propagation condition	1~2	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~2	-	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

Donometer	Confin	l lmit	Tes	st 1	Tes	st 2
Parameter	Config	Unit	Cell 1	Cell 1 Cell 2		Cell 2
				ccording to		ccording to
Angle of arrival			clause A	.3.15.4.2		.3.15.4.2
configuration	1~2		AoA1	AoA2	AoA1	AoA2
Comiguration			Spherical	Rx Beam	Spherical	Rx Beam
			coverage	Peak	coverage	Peak
Assumption for UE beams <sup>Note 7</sup>	1~2		Ro	ugh	Ro	ugh
	1	dBm/15kH	-90.6	-90.6	(Table B.2.3-2	(Table B.2.3-2
$N_{oc}^{}$ Note1	2	Z <sup>Note4</sup>	-93.7	-93.7	Rx Beam Peak <sup>Note 8</sup> +1.97dB)	Rx Beam Peak <sup>Note 8</sup>
					(Table	-3.03dB) (Table
	1		-81.6	-81.6	B.2.3-2 Rx Beam Peak <sup>Note 8</sup>	B.2.3-2 Rx Beam Peak <sup>Note 8</sup>
M Noted		dBm/SCS			+11.0dB)	+6.0dB)
$N_{oc}^{}$ Note1		Note4			(Table B.2.3-2	(Table B.2.3-2
	2		-81.7	-81.7	Rx Beam Peak <sup>Note 8</sup>	Rx Beam Peak <sup>Note 8</sup>
					+14.0dB)	+9.0dB)
$\hat{E}_s/N_{oc}$	1~2	dB	6.0	6.0	17.0	-1.0
					(Table B.2.3-2	(Table B.2. 3-2
	1	1 -75.6	-75.6	-75.6	Rx Beam	Rx Beam
			70.0	Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>	
OOD DDNote?		ID (000			+28.0dB)	+5.0dB)
SSB_RPNote2		dBm/SCS			(Table <sup>′</sup>	(Table
					B.2.3-2	B.2. 3-2
	2		-75.7	-75.7	Rx Beam	Rx Beam
					Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>
					+31.0dB)	+8.0dB)
(SSB_RP <sub>Cell 1</sub> - SSB_RP <sub>Cell 2</sub> )	1~2	dB	(	)	23	.00
$\hat{E}_{_{s}}/I_{_{ m ot}}$ BBNote6	1	dB	5.26	5.96	9.53	-3.46
s/ Lot BB. 1888	2	uD.	4.61	5.91		
					(Table	(Table
	,		50.00	50.00	B.2.3-2	B.2.3-2
	1		-50.00	-50.00	Rx Beam	Rx Beam
		JD /05 0 1			Peak <sup>Note 8</sup>	Peak <sup>Note 8</sup>
Io <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>			+52.68dB)	+33.13dB)
		IVIMZ Notes			(Table	(Table
	2		50.00	50.00	B.2.3-2	B.2.3-2
	2		-50.09	-50.09	Rx Beam Peak <sup>Note 8</sup>	Rx Beam Peak <sup>Note 8</sup>
					+55.69dB)	+36.14dB)
(IO <sub>freq 1</sub> - IO <sub>freq 2</sub> )	1~2	dB	(	)	,	.55
		ence from othe				

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 2: SSB\_RP, Es/lot, Io, (SSB\_RP<sub>Cell 2</sub> – SSB\_RP<sub>Cell 1</sub>) and (Io<sub>freq 2</sub> – Io<sub>freq 1</sub>) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet
	zone
Note 5:	Void
Note 6:	Calculation of Es/Iot <sub>BB</sub> includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor $\Delta$ MB <sub>P</sub> or $\Delta$ MB <sub>S</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS <sub>SSB</sub> = 120 kHz, selected according to the operating band of cell 2 and UE power class, without $\Delta$ MB <sub>P,n</sub> adjustment.

## A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

#### Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

#### Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes 1, 2, 3, 4				
	Cell 1	SSB_RP1 - $\delta$ +G <sub>min</sub> +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 + $\delta$ +G <sub>max</sub>			
	Cell 2	SSB_RP2 - $\delta$ +G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP2 + $\delta$ +G <sub>max</sub>			
Note 1:		uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration			
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test				
Note 3:	G <sub>min</sub> and G <sub>max</sub> are tage according to the UI	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class			
Note 4:		coverage gain difference in dB, derived as (UE Refsens – UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating a negative value.			

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes1,2,3,4, 5, 6, 7				
С	ell 2 – Cell 1	SSB_RP2 − SSB_RP1 - $\delta$ − D − G <sub>inter</sub> ≤ Reported RSRP(dB) ≤ SSB_RP2 − SSB_RP1 + $\delta$ + G <sub>inter</sub> −(X) + E				
Note 1:	SSB_RPn is the ed	equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
	configured in the te	d in the test for the cell n under consideration				
Note 2:	δ is the RSRP relat	RSRP relative accuracy requirement from Table 10.1.5.1.2-1				

Note 3:	Void
Note 4:	X is the Spherical coverage gain difference in dB, derived as (UE Refsens – UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.
Note 5:	D is the margin due to mis-alignment between fine beam and rough beam. D is the Rough Beam gain reduction in Rx beam peak direction from Table B.2.1.5.3-1, selected according to the UE power class. D is always a positive value.
Note 6:	G <sub>inter</sub> is the margin due to different antenna gain caused by frequency separation. G <sub>inter</sub> is from Table B.2.1.5.2-1, selected according to the UE power class, and is always a positive value.
Note 7:	E=3 (dB) is an additional margin to account for the actual gain difference between peak direction and spherical coverage using rough beams.

## 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	NR 15 kHz SSB SCS, 10 MHz bandwidth,	
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, 120 kHz SSB SCS, 100 MHz	
	TDD duplex mode	bandwidth, TDD duplex mode
3	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. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter Config		Unit	Tes	st 1	Test 2		
Farameter	Coming	Oill	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
	1		10: N <sub>RB,c</sub> = 52		10: N <sub>RB,c</sub> = 52		
BWchannel	2	MHz	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	10: N <sub>RB,c</sub> = 52	100: N <sub>RB,c</sub> = 66	
	3		40: N <sub>RB,c</sub> = 106		40: N <sub>RB,c</sub> = 106		
Data RBs allocated	1,2		52	24	52	66	
Data NDS allocated	3		106	24	106	00	
	1		FDD		FDD		
Duplex mode	2		TDD	TDD	TDD	TDD	
	3		TDD		TDD		
	1		N/A	TDDConf.	N/A	TDDConf.	
TDD configuration	2		TDDConf. 1.1	3.1	TDDConf. 1.1	3.1	

	3		TDDConf.		TDDConf.	
	_		2.1		2.1	
PDSCH Reference	1		SR.1.1 FDD		SR.1.1 FDD	
measurement channel	2		SR.1.1 TDD	-	SR.1.1 TDD	-
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET	1		CR.1.1 FDD	-	CR.1.1 FDD	-
Reference Channel	2		CR.1.1 TDD	-	CR.1.1 TDD	-
Reference Charmer	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
Reference Charmer	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1		SSB.1 FR1		SSB.1 FR1	
			SSB.1	SSB.3	SSB.1	SSB.3
SSB configuration	2		FR1	FR2	FR1	FR2
			SSB.2	1112	SSB.2	1112
	3		FR1		FR1	
OCNG Patterns	1~3		OP.1	OP.3	OP.1	OP.1
Initial BWP				/P.0.1	DLBW	
Configuration	1~3		ULBV	-	ULBW	-
Dedicated BWP	4.0		DLBWP.1.3		DLBWP.1.3	
configuration	1~3			/P.1.3	ULBWP.1.3	
TRS Configuration	1~3		TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~3		TCI.State.2		TCI.State.2	
					01470.4	
SMTC configuration	1~3		SM	ΓC.1	SMTC.1	
Time offset between	1~3	μs	1 ;	3	3	
Cell 2 and Cell 1		μ		- I		-
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH						
DMRS to SSS EPRE ratio of PBCH to						
PBCH DMRS						
EPRE ratio of PDCCH						
DMRS to SSS						
EPRE ratio of PDCCH to			_	_	_	_
PDCCH DMRS	1~3	dB	0	0	0	0
EPRE ratio of PDSCH						
DMRS to SSS EPRE ratio of PDSCH to						
PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>						
EPRE ratio of OCNG to						
OCNG DMRS Note 1	4.0		A	414/01/	N/A	A14/01/
Propagation condition	1~3	-	NA	AWGN	NA	AWGN
Antonno os of success?	4.0		Link only,	40	Link only,	40
Antenna configuration	1~3	-	see clause A.3.7A	1x2	see clause A.3.7A	1x2

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 1:

Note 2: Void

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test	2 NOTE 3
Faranietei	Coming	Ollit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b
Assumption for UE beams <sup>Note 4</sup>			N/A	Rough	N/A	Rouah

N oc		1~3	dBm/15 kHz		-90		NA
N oc		1~3	dBm/SS B SCS		-80.97		NA
$\hat{E}_s/N_o$	oc	1~3	dB		5		NA
Es		1~3	dBm/SC S	NA Link only,		NA Link only,	(Table B.2.3-2 Spherical coverage +1dB)
SSB_RP	Note1	1~3	dBm/SC S	see clause A.3.7A	-76.0	see clause A.3.7A	Table B.2.3-2 Spherical coverage +1dB)
$\hat{\mathbf{E}}/\mathbf{I}_{\mathrm{otbb}}$	Note6	1~3	dB		4.35		-3.81
Io <sup>Note1</sup>		1~3	dBm/ 95.04M Hz		-50.18		SSB_RP+ 28.98
Note 1: Note 2: Note 3: Note 4: Note 5:	Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.  Note 2: Void  Note 3: No additional noise is added by the test system in Test 2.  Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						
Note 6:	Calculation of Es/lota the associated Refse	ns requirer	nent in clau		S 38.101-2		

## 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.

## Test 1:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

#### Test 2:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

Table A.7.7.1.3.3: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3,4
	Cell 2	SSB_RP1 - $\delta$ +G <sub>min</sub> +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 + $\delta$ +G <sub>max</sub>
Note 1:	<del>-</del>	uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone st for the cell n under consideration

- Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test
- Note 3:  $G_{min}$  and  $G_{max}$  are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class
- Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.

## 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

Po	Parameter		Test	: 1	Te	st 2
Fai	rameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Fred	Freq1		eq1
Duplex mode			TDI	D	Т	DD
TDD configuration			TDDCo	nf.3.1		onf.3.1
BW <sub>channel</sub>		MHz	100: N <sub>RB</sub>	s,c = 66	100: N	RB,c = 66
Data RBs allocated			66			66
	Initial DL BWP			DLBW	/P.0.1	
BWP	Dedicated DL BWP			DLBW	/P.1.1	
configuration	Initial UL BWP			ULBW	/P.0.1	
	Dedicated UL BWP			ULBW	/P.1.1	
TRS configuration			TRS.2.1		TRS.2.	
Tivo configuration			TDD		1 TDD	
TCI state			TCI.State		TCI.Sta	
10101010			.0		te.0	
PDSCH Reference	measurement channel		SR.3.1		SR.3.1	
- Been Releiene	measurement ename.		TDD		TDD	
RMSI CORESET R	eference Channel		CR.3.1	_	CR.3.1	
			TDD		TDD	
Control channel RMC			CCR.3.1	-	CCR.3.	-
OONO Dellama			TDD	OD 4	1 TDD	OD 4
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
SMTC configuration			000.4	SMT		000.4
SSB configuration			SSB.1	SSB.1	SSB.1	SSB.1
PDSCH/PDCCH su	bcarrier spacing	kHz	FR2 120	FR2 120	FR2 120	FR2 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					
Propagation condition		AW	GN	AV	VGN
Antenna configuration		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: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

	Unit	Tes	t 1	Te	st 2	
	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		Setup 1 according to clause A.3.15.1		
Assumption for UE beams <sup>Note 9</sup>			F	Rough		
$N_{oc}^{}$ Note1	dBm/15kHz <sup>N</sup>	:Hz <sup>N</sup> -95		-	-95	
$N_{oc}^{}$ Note1	dBm/SCS <sup>Note</sup>	-86		-86		
$\hat{E}_s/N_{oc}$	dB	3	-3	-3	3	
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-83	-83	-89	-89	
SS-RSRQ Note2	dB	-14.77	-14.77	-16.81	-16.81	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-1.76	-1.76	-4.76	-4.76	
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup>	-5	0	-	54	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.
- Note 2: SS-RSRQ, SSB\_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: Void
- Note 7: Void
- Note 8: Void
- Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

## A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

### A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

#### A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description		
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Doro	meter	Unit	Tes	t 1	Test 2	
Faia	illetei	Onit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			Freq1	freq2	freq1	Freq2
SSB Configuration			SSB.1 FR2	SSB. 1 FR2	SSB.1 FR2	SSB.1 FR2
Duplex mode			TD	D	Т	DD
TDD configuration			TDDCo	nf.3.1	TDDC	Conf.3.1
BW <sub>channel</sub>		MHz	100: N <sub>RE</sub>	$_{3,c} = 66$	100: N	RB,c = 66
Data RBs allocated			66	6	(	66
	Initial DL BWP			DLE	3WP.0.1	
BWP configuration	Dedicated DL BWP			DLE	3WP.1.1	
	Initial UL BWP			ULE	3WP.0.1	
	Dedicated UL BWP		ULBWP.1.1			
TRS configuration			TRS.2. TRS.2. 1 TDD		-	
TCI state			TCI.Sta te.0		-	
PDSCH Reference m	easurement channel		SR.3.1 SR.3.1 TDD - 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	SMT C.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 <sup>Note 1</sup>					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWG	AWGN	AWGN
		AWGN	N	AWGN	AWGN
Antenna configuration		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: Void Note 3: Void Note 4: Void

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Te	Test 1		st 2
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2
AoA setup		Setup 1 in clause A.3.15.		Setup 1 in claus A.3.15.	
Assumption for UE beams <sup>Note 8</sup>		Ro	ugh	Ro	ugh
N oc Note1	dBm/15kHz <sup>N</sup> ote4	-94.03	-94.03	-94.03	-94.03
Note1	dBm/SCS <sup>Note</sup>	-85.0	-85.0	-85.0	-85.0
$\hat{E}_s/N_{oc}$	dB	-1.75	-1.75	-3	-1.75
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSRQ <sup>Note2</sup>	dB	-14.75	-14.75	-15.56	-15.56
Ê s /I ot	dB	-1.75	-1.75	-3	-3
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup>	-53.8	-53.8	-54.25	-54.25

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_{N_{\rm oc}}$  to be fulfilled.

Note 2: SS-RSRQ, SSB\_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Void Note 7: Void

Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

### A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

## A.7.7.3 SS-SINR

# A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

#### A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

#### A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description		
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Te	Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN		Fre	eq2	Freq2		
Duplex mode		TI	DD D	TE	DD	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	
BW <sub>channel</sub>	MHz	100: N	RB,c = 66	100: N <sub>F</sub>	RB,C = 66	
Data RBs allocated		6	66	6	6	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration			DLBV	VP.1.1		
Uplink initial BWP configuration		ULBWP.0.1				
Uplink dedicated BWP configuration		ULBWP.1.1				
DRX cycle configuration	ms	Not applicable				
TRS configuration		TRS.2.1 TDD				
TCI state			TCI.State.0			
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
P DOCT I Reference measurement channel		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1		
TAMOR GOTTEGET TREFERENCE GRIDATITIES		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			SMTC.1			
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	
ŭ		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					
Propagation conditions			AW	/GN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Te	st 1	Tes	st 3
Parameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2
		Set	up 1	Setup 1	
Angle of arrival configuration		accor	ding to	according to	
		clause	A.3.15.1	clause /	A.3.15.1
Assumption for UE beams <sup>Note 9</sup>		Ro	ugh	Ro	ugh
Note1 N oc	dBm/15kHz Note4	-105		-105	
Note1	dBm/SCS Note3	-96		-96	
$\hat{E}_s/N_{oc}$	dB	4.54	2.66	-3	-3
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-91.46	-93.34	-99	-99
SS-SINR Note2	dB	0	-3.2	-4.76	-4.76
Ê s /I ot	dB	0	-3.2	-4.76	-4.76
Io <sup>Note2</sup>	dBm/95.04 MHz Note4	4		-6	64

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_N$  to be fulfilled.

Note 2: SS-SINR, SSB\_RP, 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: Void Note 7: Void Note 8: Void

Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

## 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

Davameter	Unit	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 D	T	OD	TDD	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1
BW <sub>channel</sub>	MHz	100: N	RB,c = 66	100: N	RB,c = 66	100: N <sub>F</sub>	$_{B,c} = 66$
Data RBs allocated		6	66	6	66	6	6
Downlink initial BWP configuration				DLBV	VP.0.1		
Downlink dedicated BWP configuration				DLBV			
Uplink initial BWP configuration					VP.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					
		SR.3.1		SR.3.1		SR.3.1	
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
		ONTO	OLITO	ONTO	OLITO	OLITO	ONITO
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC.	SMTC.	SMTC.
CCD configuration		SSB.3			1 FR2	1 FR2	1 FR2
SSB configuration		FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS	dB	0	0	0	0	0	0
LFIXE TALIO OF FOO IO 333	ub	U	U	U	U	U	U

	1						
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS							
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS <sup>Note 1</sup>							
EPRE ratio of OCNG to OCNG DMRS Note							
1							
Propagation conditions		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: Void Note 3: Void Note 4: Void

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Test 2		Test 3	
Farameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
		Set	up 1	Setup 1		Setup 1	
Angle of arrival configuration	degrees	accord	ding to	according to		according to	
		A.3.	15.1	A.3.	15.1	A.3.15.1	
Assumption for UE beams <sup>Note 10</sup>		Ro	ugh	Ro	ugh	Ro	ugh
Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
$\hat{E}_s/N_{oc}$	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
SSB_RP <sup>Note2</sup>	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR <sup>Note2</sup>	dB	-0.5	-0.5	11	11	-3.0	-3.0
Ê s /I ot	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io <sup>Note2</sup>	dBm/95.04 MHz Note4	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{max}$  to be fulfilled.
- Note 2: SS-SINR, SSB\_RP, 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: Void Note 7: Void Note 8: Void Note 9: Void

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

## A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

## A.7.7.4 L1-RSRP measurement for beam reporting

#### A.7.7.4.1 SSB based L1-RSRP measurement

#### A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations 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 <sub>channel</sub>	1~2	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66
Data RBs allocated	1~2		66	66
PDSCH Reference	1		SR.3.2 TDD	SR.3.2 TDD
measurement channel	2		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD	CR.3.1 TDD
Channel	2		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	2		CCR.3.7 TDD	CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
33B Configuration	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1	DLBWP.0.1
Illitial BVVF Corlingulation	1~2		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3	DLBWP.1.3
Dedicated BWF configuration	1~2		ULBWP.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		slot320	slot320
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				
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
EPRE ratio of OCNG to OCNG				
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for  $N_{oc}$  to be fulfilled.

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2	NOTE 3
Parameter	Coming	Onit	SSB0	SSB1	SSB0	SSB1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 according to	
			A.3.15.1		A.3.15.1	
Assumption for UE beams <sup>Note 4</sup>			Rough		Rough	
N oc	1, 2	dBm/15 kHz	-100		n.a.	
$N_{oc}$	1	dBm/SS	-91		n.a.	
	2	B SCS	-88		n.a.	
$\hat{E}_{s}/I_{ot}$	1~2	dB	10	-2	n.a.	
SSB_RPNote1	1	dBm/SC	-81	-93	As in Table B.2.4-2	
SSB_RF****	2	S	-78	-90	As in Table	B.2.4-2
Io <sup>Note1</sup>	1~2	dBm/ 95.04M Hz	-51.57		SS-RSRP+28.98	
$\hat{E}_s/N_{oc}$	1~2	dB	10	-2	n.a.	

Note 1: SSB\_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

## A.7.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

#### For Test 2:

Absolute accuracy of SSB resource reported by UE in L1-RSRP report (SSB0 or SSB1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.7.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3				
	SSB0	SSB_RP0 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ SSB_RP0 + $\delta$ + G <sub>max</sub>				
	SSB1	$SSB\_RP1 - \delta + G_{min} \leqslant Reported \ RSRP(dBm) \leqslant SSB\_RP1 + \delta + G_{max}$				
Note 1:		quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the SSB n under consideration				
Note 2:	δ is the RSRP absoused in the test	P absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the lo				
Note 3:	G <sub>min</sub> and G <sub>max</sub> are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class				

## 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

BWchannel	1	MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 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.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1	1	dB	0	0
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for  $N_{oc}$  to be fulfilled.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

			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	cording to	Setup 1 acc	cording to
			A.3.	15.1	A.3.1	5.1
Assumption for UE beams <sup>Note 4</sup>			Rou	Rough		gh
$N_{oc}$	1~2	dBm/15 kHz	-100		n.a.	
$N_{oc}$	1~2	dBm/SS B SCS	-91		n.a n.a	
Ê s /I ot	1~2	dB	10 -2		n.a	ì.
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81	-93	As in Table	e B.2.4-2
Io <sup>Note1</sup>	1~2	dBm/	-59	.86	SS-RSRF	P+28.98

			95.04M			
			Hz			
$\hat{E}_{s}/N_{oc}$		1~2	dB	-51.57	-2	n.a.
Note 1:	RSRP and lo levels h	ave been c	derived from	n other paran	neters for inf	ormation purposes.
	They are not settable parameters themselves.					
Note 2:	Note 2: RSRP minimum requirements are specified assuming independent interference and noise					nterference and noise
	at each receiver antenna port.					
Note 3:	No additional noise is added by the test system in Test 2.					
Note 4:	Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE					
	implementation or test system implementation					

### A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The following requirements are to be verified:

#### For Test 1:

Absolute accuracy of CSI-RS0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

# For Test 2:

Absolute accuracy of CSI-RS resource reported by UE in L1-RSRP report (CSI-RS0 or CSI-RS1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3		
	CSI-RS0	CSI-RS _RP0 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 + $\delta$ + G <sub>max</sub>		
	CSI-RS1	CSI-RS _RP1 - $\delta$ + G <sub>min</sub> ≤ Reported RSRP(dBm) ≤ CSI-RS _RP1 + $\delta$ + G <sub>max</sub>		
Note 1:	Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration			
Note 2:	te 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test			
Note 3:	***************************************			

# 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.4 and A.5.

# 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	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 configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 2 in the initial phase
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T1 end condition	Active cell			Cell1	During T1 period the UE reselects to cell 1
	Neighbour cell			Cell2	1
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T3
RF Chann	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 offse	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 PRACI	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.

T2	S	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
ТЗ	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	Т3
TDD configuration		1, 4		N/A	
		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
PDSCH Reference		1, 4		SR.1.1 FDD	
measurement channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
RMSI CORESET		1, 4		CR.1.1 FDD	
Reference Channel		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
RMC CORESET		1, 4		CCR.1.1 FDD	
Reference Channel	2, 5 CCR.1.1 TDD				
		3, 6		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3, 4, 5, 6		OP.1	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 4		SSB.1 FR1	
3		2, 5		SSB.1 FR1	
		3, 6		SSB.2 FR1	
Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1	
configuration		, , , , , , , , ,			
Initial UL BWP		1, 2, 3, 4, 5, 6		ULBWP.0.1	
configuration		., _, 0, ., 0, 0		0	
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
Pcompensation	dB	1, 2, 3, 4, 5, 6		0	
Qhysts	dB	1, 2, 3, 4, 5, 6		0	
Qoffsets, n	dB	1, 2, 3, 4, 5, 6		0	
Cell_selection_and_		1, 2, 3, 4, 5, 6		<u> </u>	
reselection_quality_m		1, 2, 0, 1, 0, 0		SS-RSRP	
easurement					
Ê , /I ot	dB	1, 4	-4	-infinity	12
		2, 5			
		3, 6			
<b>λ</b> 7	dBm/SCS	1, 4		-98	
$N_{oc}$ Note2		2, 5		-98	
		3, 6		-95	
<b>A</b> 7	dBm/15 kHz	1, 4		-98	
$N_{oc}$ Note2	abili, to it iz	2, 5			
		3, 6			
$\hat{E}_{s}/N_{oc}$	dB	1, 4	-4	-infinity	12
= s / ··· oc	u <sub>D</sub>	2, 5	7	ii ii ii ii ii y	12
		3, 6			
SS-RSRP Note3	dBm/SCS	1, 4	-102	-infinity	-86
JO-NONF	ubii/303	2, 5	-102	-infinity	-86
		3, 6	-99	-infinity	-83

lo	dBm/9.36 MHz	1, 4	-68.60	-70.05	-57.78	
	dBm/9.36 MHz	2, 5	-68.60	-70.05	-57.78	
	dBm/38.16 MHz	3, 6	-62.50	-63.95	-51.69	
Treselection	S	1, 2, 3, 4, 5, 6	0	0	0	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50			
Thresh <sub>x, highP</sub>	dB	1, 2, 3, 4, 5, 6	48			
Thresh <sub>serving, lowP</sub>	dB	1, 2, 3, 4, 5, 6	44			
Thresh <sub>x, lowP</sub>	dB	1, 2, 3, 4, 5, 6	50		•	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant

over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit		Cell 1		
		T1	T2	T3	
E-UTRA RF Channel number		1			
BW <sub>channel</sub>	MHz	10			
OCNG Patterns defined in TS 36.133 [15]			for test configur		
clause A.3.2		OP.2 FDD	for test configu	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 <sup>Note 1</sup>	dB				
OCNG_RB <sup>Note 1</sup>	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			
SnonintrasearchP	dB		50		
Thresh <sub>x, highP</sub>	dB		48		
Thresh <sub>serving, lowP</sub>	dB		44		
Thresh <sub>x, lowP</sub>	dB		50		
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

# 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 Registration procedure for mobility and periodic registration update 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:  $T_{evaluate, EUTRAN} + T_{SI-EUTRA}$ ,

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_N$  to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

#### Where:

Thigher\_priority\_search See clause 4.2.2 in TS 36.133 [15]

T<sub>evaluate, NR</sub> See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T<sub>SI-NR</sub> 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.

T<sub>evaluate, EUTRAN</sub>See Table 4.2.2.5-1 in clause 4.2.2.5

T<sub>SI-EUTRA</sub> 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	s only required to be tested in one of the supported test configurations

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Daramatar	Value	Commont

NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel I	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	rement quantity		RSRP	
b2-Threshold1	•	dBm	-83	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 In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset betwe	en cells		3 ms	Asynchronous cells
Gap pattern config	guration 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	on 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 <sup>Note1</sup>		4, 5, 6		6	
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6		1	
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6		5 MHz: N <sub>RB,c</sub> = 25	)
				10 MHz: N <sub>RB,c</sub> = 5	
			2	$0 \text{ MHz: } N_{RB,c} = 10$	00
PRACH ConfigurationNote2		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 <sup>Note3</sup>				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 FDI	
Channel <sup>Note3</sup>		4, 5, 6		5 MHz: R.11 TDD	
				10 MHz: R.6 TDD	
				20 MHz: R.10 TDI	
OCNG Patterns <sup>Note3</sup>		1, 2, 3		MHz: OP.20 FD	
				0 MHz: OP.10 FD	
				0 MHz: OP.17 FD	
		4, 5, 6		5 MHz: OP.9 TDE	
				10 MHz: OP.1 TD	D

			2	0 MHz: OP.7 TD	D
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB			0	
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA <sup>Note4</sup>					
OCNG_RB <sup>Note4</sup>					
N <sub>oc</sub> Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	7	7	7
Ê <sub>s</sub> /I <sub>ot</sub> <sup>Note6</sup>	dB	1, 2, 3, 4, 5, 6	7	7	7
RSRP <sup>Note6</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
SCH_RPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
Io <sup>Note6</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	•
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix Note7					

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 6:  $\hat{E}_s/I_{ot}$ , RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parameter	Unit	Configuration		Cell 2	
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4		FDD	
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
BW <sub>channel</sub>	MHz	1, 4	10:	$N_{RB,c} = 52 (FI)$	DD)
		2, 5	10:	$N_{RB,c} = 52 (TI)$	DD)
		3, 6	40:	$N_{RB,c} = 106 (T$	DD)
PDSCH reference measurement		1, 4		SR.1.1 FDD	
channel					
		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
PRACH configuration			FR1 P	RACH configu	ration 1
OCNG pattern <sup>Note1</sup>		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			ULBWP.1.1	
	BWP			0	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
ou com garanen		3, 6		SSB.2 FR1	
b2-Threshold2NR	dBm	1, 2, 4, 5		-106	
		3, 6		-103	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH_DMRS to SSS	1				
EPRE ratio of PBCH to	1				
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to					
SSS					
EPRE ratio of PDCCH to	1				
PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to	1				
SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS					
N <sub>oc</sub> Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6		-98	
N <sub>oc</sub> Note2	dBm/SCS	1, 2, 4, 5		-98	
		3, 6		-95	
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
Ê <sub>s</sub> /I <sub>ot</sub> Note3	dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
SS-RSRP <sup>Note3</sup>	dBm/SCS	1, 2, 4, 5	-inifinity	-98	-98
		3, 6	-inifinity	-95	-95
Io <sup>Note3</sup>	dBm/9.36	1, 2, 4, 5	-70.05	-67.04	-67.04
	MHz				
	dBm/38.16 MHz	3, 6	-63.96	-60.94	-60.94
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2 Low	
COITEIAUOH WAUIX					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 3:  $\hat{E}_s/I_{ot}$ , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

# A.8.3.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 112 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<sub>interrupt</sub>, where:

RRC procedure delay = 50 ms and is specified in TS36.133.

 $T_{interrupt} = 62$  ms in the test;  $T_{interrupt}$  is defined in TS36.133 clause 5.3.4.3.

# 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 1 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	Va	lue	Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel		Config	,	1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			is used.
NR RF Channel		Config	,	ı	One NR FR1 carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	Co	11 4	Cell 1 is on E-UTRA RF channel
		1,2,3,4,5,6	Cell 1		number 1.
Neighbour cell		Config	Co	11.2	Cell 2 is on NR RF channel number
		1,2,3,4,5,6	Cell 2		1.
SSB configuration		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	2 FR1	As specified in clause A.3.10.1
CP length		Config	Normal		Applicable to both cells.
		1,2,3,4,5,6			
DRX		Config	OI	=======================================	DRX is not used
		1,2,3,4,5,6	OI	FF	

Frame time offset between serving and neighbour cells	ms	Config 1,2,3,4	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 5,6	3	3	Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	S	Config 1,2,3,4,5,6	,	1	

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2
NR RF Channel Number		Config 1,2,3,4,5,6	1
Duplex mode		Config 1,4	FDD
Duplex mode		Config 2,3,5,6	TDD
		Config 1,4	10: N <sub>RB,c</sub> = 52
BWchannel	MHz	Config 2,5	10: N <sub>RB,c</sub> = 52
		Config 3,6	40: N <sub>RB,c</sub> = 106
TDD configuration		Config 2,5	TDDConf.1.1
		Config 3,6	TDDConf.2.1
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1
SMTC configuration		Config 1,2,3,4,5,6	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2,4,5	15
spacing	KIIZ	Config 3,6	30
EPRE ratio of PSS to SSS	dB		
EPRE ratio of PBCH DMRS to SSS	dB		
EPRE ratio of PBCH to PBCH DMRS	dB	Config 1,2,3,4,5,6	0
EPRE ratio of OCNG DMRS to SSS Note 1	dB		
EPRE ratio of OCNG to OCNG DMRS Note 1	dB		
N <sub>oc</sub> Note2	dBm/15kHz		-98
Noc Note2	dD/CCC	Config 1,2,4,5	-98
Noc 1002	dBm/SCS	Config 3,6	-95
SS-RSRP Note 3, 4	dBm/SCS	Config 1,2,4,5	-94
33-K3KF	ubili/303	Config 3,6	-91
Ê <sub>s</sub> /I <sub>ot</sub>	dB	Config 1,2,3,4,5,6	4
Ê <sub>s</sub> /N <sub>oc</sub>	dB	Config 1,2,3,4,5,6	4
Io Note 3	dBm/9.36MHz	Config 1,2,4,5	-64.59
10	dBm/38.16MHz	Config 3,6	-58.50
Propagation Condition		Config 1,2,3,4,5,6	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 $N_{cc}$ 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×TTI<sub>DCCH</sub> 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 1 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: T	he 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	7	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN 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	Се	ell 1	Cell 1 is on E-UTRA RF channel number 1.	
Neighbour cell		Config 1,2,3,4,5,6	Ce	ell 2	Cell 2 is on NR RF channel number 1.	
		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1	
SSB configuration		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	No	rmal	Applicable to both cells.	
DRX		Config 1,2,3,4,5,6	DR	XX.4	DRX configuration as specified in clause A.3.3.4	
Frame time offset between serving and neighbour cells	ms	Config 1,2,4,5	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.	
	μs	Config 3,6	3		Synchronous cells.	
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.	
T1	S	Config 1,2,3,4,5,6	·	1		

# A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon  $T_{RRC\_procedure\_delay} + T_{measure\_SFTD1}$  from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI<sub>DCCH</sub> 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	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	Va	lue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1	•	One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cel	I 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used

Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 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	
		shold1 is defined shold2NR is def		-	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		4, 5, 6	6
configuration <sup>Note1</sup>			
TDD uplink-downlink		4, 5, 6	1
configuration <sup>Note1</sup> BW <sub>channel</sub>	NAL I-	4 0 0 4 5 0	5 MIL- N. OF
BVVchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub> = 25
			10 MHz: N <sub>RB,c</sub> = 50
DDCCII naramatara:		1 2 2	20 MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD
DL Reference Measurement Channel <sup>Note2</sup>			10 MHz: R.3 FDD
Channel		4.5.0	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
		1, 2, 3	10 MHz: R.6 FDD
parameters: DL Reference Measurement			20 MHz: R.10 FDD
Channel <sup>Note2</sup>		4, 5, 6	5 MHz: R.11 TDD
Chamie		4, 5, 6	10 MHz: R.6 TDD
			20 MHz: R.10 TDD
OCNG Patterns <sup>Note2</sup>		1, 2, 3	5 MHz: OP.20 FDD
OCNG Fatterns		1, 2, 3	10 MHz: OP.10 FDD
			20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD
		1, 0, 0	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 <sup>Note3</sup>			
OCNG_RB <sup>Note3</sup>			
N <sub>oc</sub> Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104

Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	17	17
Ê <sub>s</sub> /I <sub>ot</sub> Note5	dB	1, 2, 3, 4, 5, 6	17	17
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N <sub>RB,c</sub> /50)	-59.13+10log (N <sub>RB,c</sub> /50)
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWG	iN
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5:  $\hat{E}_s$ /I<sub>ot</sub>, 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	С	ell 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 4	F	DD
		2, 3, 5, 6	T	DD
TDD configuration		2, 5	TDD0	Conf.1.1
		3, 6	TDD0	Conf.2.1
BW <sub>channel</sub>	MHz	1, 2, 4, 5	10: N	RB,c = 52
		3, 6	40: N <sub>R</sub>	B,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	C	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ITC.2
and A.3.11.2		2, 3, 5, 6	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	15	
		3, 6	30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-	101
		3, 6		.98
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)				
NoteŹ N oc	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
Note2	dBm/SCS	1, 2, 4, 5		·98
		3, 6		<u>95</u>
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_s/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io <sup>Note3</sup>	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26

		dBm/38.16MH	3, 6	-63.95	-56.16		
		Z					
Propagat	tion Condition		1, 2, 3, 4, 5, 6	A۱	NGN		
Antenna	Configuration and Correlation		1, 2, 3, 4, 5, 6	•	1x2		
Matrix							
Note 1:	OCNG shall be used such that the	cell is fully alloca	ted and a constan	t total transmitted	power spectral		
	density is achieved for all OFDM s	symbols.					
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_N$ to be fulfilled.						
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each						
	receiver antenna port.						

#### A.8.4.2.1.2 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<sub>DCCH</sub> 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. 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:	lote 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		Va	lue		Comment
		configuratio n	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF		1, 2, 3, 4, 5,			1		One E-UTRA carrier frequency is used.
Channel Number		6					
NR RF Channel Number		1, 2, 3, 4, 5, 6	1				One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0				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				As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2	Note 2			SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5,	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3µs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	2	11	2	11	

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	

	1, 2, 3	FDD	)	
	4, 5, 6	TDE	)	
	4, 5, 6	6		
	4, 5, 6	1		
MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub> = 25 10 MHz: N <sub>RB,c</sub> = 50		
		20 MHz: N <sub>RB,c</sub> = 50		
	1 2 2			
	1, 2, 3			
	456			
	1, 0, 0	- · · · · · · · · · · · · · · · · · · ·	– –	
	1, 2, 3			
	., _, -			
		20 MHz: R.10 FDD		
	4, 5, 6	5 MHz: R.	I1 TDD	
	, ,	10 MHz: R	.6 TDD	
		20 MHz: R.	10 TDD	
	1, 2, 3			
		10 MHz: OP.10 FDD 20 MHz: OP.17 FDD 5 MHz: OP.9 TDD		
	4, 5, 6			
		10 MHz: OP.1 TDD		
		20 MHz: OP.7 TDD		
dBm				
	1, 2, 3, 4, 5, 6			
- ID		0		
ав		0		
dDm/45kl l=	100156	10.	1	
	4 0 0 4 5 0		17	
	1 2 2 1 5 6	1 /	1 /	
dB	1, 2, 3, 4, 5, 6	17 -87	17 -87	
dB dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
dB			-87 -87 -59.13+10log (N <sub>RB,c</sub>	
dB dBm/15kHz dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-87 -87 -59.13+10log (N <sub>RB,c</sub> /50)	-87 -87 -59.13+10log (N <sub>RB,c</sub> /50)	
dB dBm/15kHz dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-87 -87	-87 -87 -59.13+10log (N <sub>RB,C</sub> /50) N	
	MHz  dBm  dBm  dBm  dB  dB  dB  dB	4, 5, 6 4, 5, 6  4, 5, 6  MHz  1, 2, 3, 4, 5, 6  1, 2, 3  4, 5, 6  1, 2, 3  4, 5, 6  1, 2, 3  4, 5, 6  dBm  1, 2, 3, 4, 5, 6  dBm  1, 2, 3, 4, 5, 6  dB  dBm/15kHz  1, 2, 3, 4, 5, 6  dB  1, 2, 3, 4, 5, 6	4, 5, 6       TDD         4, 5, 6       6         MHz       1, 2, 3, 4, 5, 6       5 MHz: N <sub>R</sub> 10 MHz: N <sub>R</sub> 20 MHz: N <sub>R</sub> 20 MHz: R. 10 MHz: R. 20 MHz: R. 10 MHz: R. 20 MHz: R. 10 MHz: R. 20 MHz: R. 10 MHz: R. 20 MHz: R. 11 MHz: R. 20 MHz: R. 11 MHz: R. 20 MHz: R. 11	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5:  $\hat{E}_s/I_{ot}$ , RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cel	12	
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 4	FD	D	
·		2, 3, 5, 6	TDD		
TDD configuration		2, 5	TDDC	onf.1.1	
-		3, 6	TDDC	onf.2.1	
BW <sub>channel</sub>	MHz	1, 2, 4, 5	10: N <sub>RE</sub>	s,c = 52	
		3, 6	40: N <sub>RB</sub>		
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:	5	
		3, 6	3		
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-10	01	
		3, 6	-9	8	
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			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 N oc	dBm/15kHz	1, 2, 3, 4, 5, 6	-9	8	
Note2 N <sub>oc</sub>	dBm/SCS	1, 2, 4, 5	-9	8	
oc oc		3, 6	-9	5	
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 <sup>Note3</sup>	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26	
	dBm/38.16MH	3, 6	-63.95	-56.16	
	Z				
Propagation Condition		1, 2, 3, 4, 5, 6	AW	GN	
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x2		
Matrix					
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 spectral density is achieved for all OFDM symbols.

# 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

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_N$  to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 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<sub>DCCH</sub> higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

#### A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note 1: The UE is only 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	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5,	E-UTRA ce	ell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 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 <sup>Note1</sup>		4, 5, 6	6		
TDD uplink-downlink configuration <sup>Note1</sup>		4, 5, 6	1		
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: N <sub>RB,c</sub> = 25		

			20 MHz: N <sub>R</sub>	B c = 100		
PDSCH parameters:		1, 2, 3	5 MHz: R.			
DL Reference Measurement		., _, •	10 MHz: R			
Channel <sup>Note2</sup>			20 MHz: R	.6 FDD		
		4, 5, 6	5 MHz: R.			
		, -, -	10 MHz: R			
			20 MHz: R	.3 TDD		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.	11 FDD		
parameters:		, ,	10 MHz: R			
DL Reference Measurement			20 MHz: R.10 FDD			
Channel <sup>Note2</sup>		4, 5, 6	5 MHz: R.	11 TDD		
			10 MHz: R	.6 TDD		
			20 MHz: R.	10 TDD		
OCNG Patterns <sup>Note2</sup>		1, 2, 3	5 MHz: OP	.20 FDD		
			10 MHz: OP	.10 FDD		
			20 MHz: OP			
		4, 5, 6	5 MHz: OP			
			10 MHz: OP.1 TDD			
			20 MHz: OP.7 TDD			
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77			
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 <sup>Note3</sup>						
OCNG_RB <sup>Note3</sup>						
N <sub>oc</sub> <sup>Note4</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-104			
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	17 17			
Ê <sub>s</sub> /I <sub>ot</sub> Note5	dB	1, 2, 3, 4, 5, 6	17	17		
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
SCH_RP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N <sub>RB,c</sub> /50) -59.13+10log (N <sub>RB,c</sub> /50)			
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWG	N		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2			
Correlation Matrix Note6						

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Note 5: Ê<sub>s</sub>/I<sub>ot</sub>, RSRP, SCH\_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	C	ell 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	DD
TDD configuration		2, 5	TDDC	onf.1.1
•		3, 6	TDDC	onf.2.1
3W <sub>channel</sub>	MHz	1, 2, 4, 5		B,c = 52
		3, 6	40: N <sub>RE</sub>	<sub>B,c</sub> = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6		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	15
		3, 6	3	30
o2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-1	01
		3, 6	-(	98
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				
PRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-:	98
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
$\hat{\mathbb{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
$\hat{E}_{s}/N_{oc}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
O <sup>Note3</sup>	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MH	3, 6	-63.95	-56.16
Propagation Condition	Z	1, 2, 3, 4, 5, 6	AW	/GN
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		x2
Matrix		., _, 0, 1, 0, 0	•	

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{N_{\infty}}$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

#### A.8.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

#### A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is of	only required to be tested in one of the supported test configurations.

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configuratio	Test	Test 2	Test	Test 4	
		n	1		3		
E-UTRA RF		1, 2, 3, 4, 5,	1				One E-UTRA carrier frequency is used.
Channel Number		6					
NR RF Channel		1, 2, 3, 4, 5,	1				One FR1 NR carrier frequency is used.
Number		6					
Active cell		1, 2, 3, 4, 5,	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF
		6	,				channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell 2				NR cell 2 is on NR RF channel number
_		6					1

Gap Pattern Id		1, 2, 3, 4, 5, 6					As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6					As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3µs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	2	13	2	13	
		Threshold1 is d Threshold2NR i				1-4	

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration Note1		4, 5, 6	6		
TDD uplink-downlink configuration Note1		4, 5, 6	1		
BW <sub>channel</sub>	MHz	1, 2, 3, 4, 5, 6	5 MHz: $N_{RB,c} = 25$ 10 MHz: $N_{RB,c} = 50$		
			20 MHz: N <sub>RB,c</sub> =	100	
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FI	DD	
DL Reference Measurement	nt		10 MHz: R.3 FDD		
Channel <sup>Note2</sup>			20 MHz: R.6 FDD		
		4, 5, 6	5 MHz: R.4 TDD		
			10 MHz: R.0 T	DD	
			20 MHz: R.3 T	DD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 F	DD	
parameters:			10 MHz: R.6 FDD		
DL Reference Measurement			20 MHz: R.10 FDD		
Channel <sup>Note2</sup>		4, 5, 6	5 MHz: R.11 TDD		
			10 MHz: R.6 T	DD	
			20 MHz: R.10 T	DD	
OCNG Patterns <sup>Note2</sup>		1, 2, 3	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: OF	P.1 TDD		
			20 MHz: OP.7 TDD			
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77			
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 <sup>Note3</sup>						
OCNG_RB <sup>Note3</sup>						
N <sub>oc</sub> Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1		
Ê <sub>s</sub> /N <sub>oc</sub>	dB	1, 2, 3, 4, 5, 6	17	17		
Ê <sub>s</sub> /I <sub>ot</sub> Note5	dB	1, 2, 3, 4, 5, 6	17	17		
RSRP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
SCH_RP <sup>Note5</sup>	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
Io <sup>Note5</sup>	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N <sub>RB,c</sub> /50)	-59.13+10log (N <sub>RB,c</sub> /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWGN			
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2			
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<sub>oc</sub> 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	C	ell 2	
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4	F	DD	
		2, 3, 5, 6	T	DD	
TDD configuration		2, 5	TDDC	Conf.1.1	
		3, 6	TDDC	Conf.2.1	
BW <sub>channel</sub>	MHz	1, 2, 4, 5	10: N	RB,c = 52	
		3, 6	40: N <sub>RB,c</sub> = 106		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	0	P.1	
SMTC configuration defined in A.3.11.1		1, 4	SM	ITC.2	
and A.3.11.2		2, 3, 5, 6	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15	
		3, 6		30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-	101	
		3, 6	-	98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6	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)				
Note2 N oc	dBm/15kHz	1, 2, 3, 4, 5, 6	-	98
Note2	dBm/SCS	1, 2, 4, 5	-	98
IV oc		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 <sup>Note3</sup>	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MH	3, 6	-63.95	-56.16
	Z			
Propagation Condition		1, 2, 3, 4, 5, 6	AV	VGN
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1	x2
Matrix				
Note 1: OCNG shall be used such that the	e cell is fully alloca	ted and a constant	total transmitted	power spectral
density is achieved for all OFDM s				
Note 2: Interference from other cells and r				
subcarriers and time and shall be	modelled as AWG	SN of appropriate po	ower for $_{N_{oc}}$ to be	e fulfilled.
Note 3: SS-RSRP and lo levels have beer	n derived from other	er parameters for in	formation purpos	ses. They are not
settable parameters themselves.				

#### A.8.4.2.4.2 Test Requirements

receiver antenna port.

Note 4:

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%.

SS-RSRP minimum requirements are specified assuming independent interference and noise at each

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

# A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

#### A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration Description						
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations.						

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA ce	ell 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 b1-ThresholdNR is defined 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	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.2.1		1, 2	Set	tup 2a
Assumption for UE beams <sup>Note 5</sup>		1, 2	R	ough
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD0	Conf.3.1
BW <sub>channel</sub>	MHz	1, 2	100: N	$I_{RB,c} = 24$
OCNG patterns defined in A.3.2.1.3		1, 2	C	P.3
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	•	120
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-112	
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)				1
Ês	dBm/SCS	1, 2	-Infinity	-80.6
SSB-RP Note 3	dBm/SCS	1, 2	-Infinity	-80.6
Ê <sub>s</sub> /I <sub>ot</sub> BB Note 6	dB	1, 2	-Infinity	8.3
Io <sup>Note3</sup>	dBm/95.04MH z	1, 2	-Infinity	-56.0
Propagation Condition		1, 2	Α\	WGN

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 6: Calculation of Es/lot<sub>BB</sub> 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 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table 6.2.1.3-4.

# A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms			
UE power class 3	3200	1600			

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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. 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

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.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	Value				Comment
		configuratio	Test Test 2 Test Test 4		Test 4		
		n	1		3		
E-UTRA RF		1, 2	1				One E-UTRA carrier frequency is used.
Channel Number							
NR RF Channel		1, 2	1			One FR2 NR carrier frequency is used.	
Number							

Active cell		1, 2, 3, 4, 5,	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, 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.12	DRX. 9	DRX.12	As specified in clause A.3.3	
Time offset between serving and neighbour		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
cells		2	3μs				Synchronous cells.	
T1	S	1, 2, 3, 4, 5, 6	5					
T2	S	1, 2, 3, 4, 5, 6	6	83	6	83		
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.6.1-3								

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Se	tup 1
Assumption for UE beams <sup>Note 5</sup>		1, 2	R	ough
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD0	Conf.3.1
BW <sub>channel</sub>	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	C	)P.1
SMTC configuration defined in A.3.11.1		1	SMTC.2	
and A.3.11.2		2	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106
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				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 N oc	dBm/15kHz	1, 2	-104.7		
Note2 N oc	dBm/SCS	1, 2	-95.7		
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	8	
$\hat{E}_s/N_{oc}$	dB	1, 2	-Infinity	8	
Io <sup>Note3</sup>	dBm/95.04MH	1, 2	-66.7	-58.0	
	Z				
Propagation Condition		1, 2	AWGN		

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $_N$  to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

# A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms	Test 3: D3 ms	Test 4: D4 ms	
UE power class 3	4800	51200	4800	51200	

NOTE: The actual overall delays measured in the test may be up to 2xTTI<sub>DCCH</sub> 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

Cor	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.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Numbers		1, 2		1	One E-UTRA carrier frequency is used.
NR RF Channel Numbers		1, 2	1		One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA 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 I	o1-Thre	sholdNR is o	defined in Tab	le A.8.4.2.7.1-	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

Assumption for UE beams <sup>Note 5</sup> 1, 2         Ro           NR RF Channel Number         1, 2         TI           Duplex mode         1, 2         TI           TDD configuration         1, 2         TDDC           BW <sub>channel</sub> MHz         1, 2         100: Ni           OCNG patterns defined in A.3.2.1.1         1, 2         OI           SMTC configuration defined in A.3.11.1         1         SM'           and A.3.11.2         2         SM'           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	ΤΛ	
Assumption for UE beamsNote 5         1, 2         Ro           NR RF Channel Number         1, 2         TI           Duplex mode         1, 2         TI           TDD configuration         1, 2         TDDC           BWchannel         MHz         1, 2         100: NI           OCNG patterns defined in A.3.2.1.1         1, 2         OI           SMTC configuration defined in A.3.11.1         1         SMI           and A.3.11.2         2         SMI           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	T2	
NR RF Channel Number         1, 2           Duplex mode         1, 2         TI           TDD configuration         1, 2         TDDC           BW <sub>channel</sub> MHz         1, 2         100: Ni           OCNG patterns defined in A.3.2.1.1         1, 2         O           SMTC configuration defined in A.3.11.1         1         SMI           and A.3.11.2         2         SMI           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	tup 1	
Duplex mode         1, 2         TI           TDD configuration         1, 2         TDDC           BWchannel         MHz         1, 2         100: Nr           OCNG patterns defined in A.3.2.1.1         1, 2         OI           SMTC configuration defined in A.3.11.1         1         SM'           and A.3.11.2         2         SM'           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	ough	
TDD configuration         1, 2         TDDC           BW <sub>channel</sub> MHz         1, 2         100: N <sub>I</sub> OCNG patterns defined in A.3.2.1.1         1, 2         O           SMTC configuration defined in A.3.11.1 and A.3.11.2         1         SM'           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	1	
BW <sub>channel</sub> MHz         1, 2         100: No.           OCNG patterns defined in A.3.2.1.1         1, 2         0           SMTC configuration defined in A.3.11.1         1         SMT           and A.3.11.2         2         SMT           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	TDD	
OCNG patterns defined in A.3.2.1.1         1, 2         OI           SMTC configuration defined in A.3.11.1 and A.3.11.2         1         SM           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	TDDConf.3.1	
SMTC configuration defined in A.3.11.1         1         SM           and A.3.11.2         2         SM           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	100: N <sub>RB,c</sub> = 66	
and A.3.11.2         2         SM'           PDSCH/PDCCH subcarrier spacing         kHz         1, 2         1	P.1	
PDSCH/PDCCH subcarrier spacing kHz 1, 2 1.	TC.2	
·	TC.1	
ht ThrosholdND LIE power class 2 dPm/CCC 1 2	20	
DI-THESHORINK   DE POWER Class 3   delh/303   1,2   -1	06	
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) Note2  APm/15t/Hz 1 2 10		
	-104.7	
$N_{oc}$ Note2 dBm/SCS 1, 2 -9	-95.7	
SS-RSRP Note 3 dBm/SCS 1, 2 -Infinity	-87.7	
$\hat{E}_{x}/I_{cx}$ dB 1, 2 -Infinity	8	
$\hat{E}_{s}/N_{oc}$ dB 1, 2 -Infinity	8	
lo <sup>Note3</sup> dBm/95.04MH 1, 2 -66.7	-58.0	
Z		
Propagation Condition 1, 2 AW		

- 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  $N_{\infty}$  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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.8.4.2.7.2 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 required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to  $2xTTI_{DCCH}$  higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)		
	Test 1: D1 ms Test 2: D2 ms		
UE power class 3	4160	2080	

# A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

#### A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Cor	nfiguration	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only 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 n	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2		,	1		One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2	1			One FR2 NR carrier frequency is used.	
Active cell		1, 2	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 gap offset		1, 2	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	S	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX			DRX. 9	DRX.12	DRX. 9	DRX.12	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	3us			Synchronous cells.	
T1	s	1, 2	5				
T2	s	1, 2	7	70	7	70	
Note 1: The va	lue of b1-	ThresholdNR is	defined i	in Table A.	8.4.2.8.1	-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	Co	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Se	tup 1
Assumption for UE beams <sup>Note 5</sup>		1, 2	Ro	bugh
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDDC	Conf.3.1
BW <sub>channel</sub>	MHz	1, 2	100: N	RB,c = 66
OCNG patterns defined in A.3.2.1.1		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		106
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)				
Note2 N <sub>oc</sub>	dBm/15kHz	1, 2	-1	04.7
Note2	dBm/SCS	1, 2	-6	5.7
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	dB	1, 2	-Infinity	8
$\hat{E}_s/N_{oc}$	dB	1, 2	-Infinity	8
Io <sup>Note3</sup>	dBm/95.04MH	1, 2	-66.7	-58.0
	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  $_N$  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: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

#### A.8.4.2.8.2 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 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<sub>DCCH</sub> 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

Config	guration	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 or	nly 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 <sup>Note1</sup>		6
TDD uplink-downlink configuration <sup>Note1</sup>		1
BW <sub>channel</sub>		5 MHz: N <sub>RB,c</sub> = 25
		10 MHz: N <sub>RB,c</sub> = 50
		20 MHz: N <sub>RB,c</sub> = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel <sup>Note2</sup>		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
DOFIOLI/DDOOLI/DLIIOLL		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel <sup>Note2</sup>		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 <sup>Note2</sup>		5 MHz: OP.20 FDD
CONC Fallering		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 <sup>Note3</sup>	dB	
OCNG_RB <sup>Note3</sup>	dB	
NocNote4	dBm/15 kHz	-104
Ês/Noc	dB	-3
Ê <sub>s</sub> /I <sub>ot</sub>	dB	-3
RSRP Note5	dBm/15 kHz	-107
SCH_RP Note5	dBm/15 kHz	-107
10 Mores	dBm/Ch BW	-74.45
		+10log
Dran a nation Constition		(N <sub>RB,c</sub> /50)
Propagation Condition		AWGN
Antenna Configuration	link configuration	1x2

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Note 5: 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	I	1~6		freq1
		1,4		FDD
Duplex mode		2,5		TDD
		3,6		TDD
		1,4		N/A
TDD Config	guration	2,5		TDDConf.1.1
		3,6		TDDConf.2.1
		1,4		10: $N_{RB,c} = 52$
BW <sub>channel</sub>		2,5	MHz	10: N <sub>RB,c</sub> = 52
		3,6		40: N <sub>RB,c</sub> = 106
PDSCH Re	ference measurement	1,4		SR.1.1 FDD
channel	icremee measurement	2,5		SR.1.1 TDD
orial into		3,6		SR.2.1 TDD
		1,4		CR.1.1 FDD
RMSI COR	ESET Reference Channel	2,5		CR.1.1 TDD
		3,6		CR.2.1 TDD
		1,4		CCR.1.1 FDD
RMC COR	ESET Reference Channel	2,5	-	CCR.1.1 TDD
		3,6		CCR.2.1 TDD
		1,4		SSB.1 FR1
SSB config	uration	2,5		SSB.1 FR1
		3,6		SSB.2 FR1
SMTC conf		1~6		SMTC.1
DL BWP co		1~6		DLBWP.1.1
UL BWP co	0	1~6		ULBWP.1.1
OCNG Patt		1~6		OP.1
	of PSS to SSS			
	of PBCH DMRS to SSS	PBCH DMRS to SSS PBCH to PBCH DMRS PDCCH DMRS to SSS PDCCH to PDCCH		
DMRS	of PDCCH to PDCCH			
	of PDSCH DMRS to SSS	1~6	dB	0
	of PDSCH to PDSCH	1~0	QD.	U
DMRS	017030110703011			
	of OCNG DMRS to SSSNote			
1	of Colve Divine to Coc			
FPRF ratio	of OCNG to OCNG DMRS			
Note 1	or corre to corre brance			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
N <sub>ac</sub> Note2	NR_FDD_FR1_D,	1.6	dDm/45141-	104
TY <sub>oc</sub> NO(82	NR_TDD_FR1_D	1~6	dBm/15kHz	-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
$N_{oc\ { m Note2}}$	NR_FDD_FR1_B	1,2,4,5	dBm/SSB SCS	-104
* oc Note2	NR_TDD_FR1_C	1,2,7,0		104
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			

	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	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			
Ê , /I ot		1~6	dB	-3
$\hat{E}_{s}/N_{oc}$	<del>_</del>	1~6	dB	-3
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5		-107
	NR_TDD_FR1_D	1,2,4,0		-107
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
SS-RSRP	NR_FDD_FR1_H		dBm/SCS	
Note3	NR_FDD_FR1_A,		abili/occ	
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	3,6		-104
	NR_TDD_FR1_D	0,0		
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_TDD_FR1_D	,,,,,,,		
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C		JD. /00 10	
	NR_FDD_FR1_D,	3,6	dBm/38.16	-68.18
	NR_TDD_FR1_D	, ·	MHz	
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
Dropagat's	NR_FDD_FR1_H	1.6		ANA/ONI
Propagation		1~6		AWGN
Antenna configuration  Note 1: OCNG shall be used such that		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 $_{N_{\infty}}$ to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Condition	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 re	equired 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

	Parame	eter	Unit	Tes			st 2	
SSB ARFC	N			Ce			e <b>II 2</b> eq1	
		Config 1,4		fre		DD IIE	<del>9</del> 41	
Duplex mod	de	Config 2,3,5,6	<u>.</u>			DD .		
		Config 1,4		Not Applicable				
TDD configuration		Config 2,5				onf.1.1		
		Config 3,6		TDDConf.2.1				
Downlink in	nitial BWP cor					VP.0.1		
		<u> </u>				VP.0.1		
Uplink initial BWP configuration  DRX Cycle configuration								
DRX Cycle	configuration	 	ms		пот Ар	plicable		
		Config 1,4						
	Reference ent channel	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 Patt	terns			OP.1				
SS-RSSI-M	leasurement			Not Applicable				
SMTC conf	igruation			SMTC.1				
000 "		Config 1,2,4,5			SSB.	1 FR1		
SSB config	uration	Config 3,6			SSB.	2 FR1		
PDSCH/PD	NCCH	Config 1,2,4,5			1	5		
subcarrier		Config 3,6	kHz	30				
	of PSS to SSS	<u> </u>						
EPRE ratio o	of PBCH DMRS							
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 o	of PDSCH DMR	S 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?	Config	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k	0.4	GE	-1	17	
N oc	1,2,3,4,5,6	NR_FDD_FR1_B	Hz	-94	.co.	-11	6.5	
		NR_TDD_FR1_C	1			-116.5 -116		

	1			1	
		NR_FDD_FR1_D NR_TDD_FR1_D			-115.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-115
		NR_FDD_FR1_G	j		-114
		NR_FDD_FR1_H			-113.5
	Config 1,2,4	,5		-94.65	Same as Noc for 15kHz
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-114
Note2		NR_FDD_FR1_B	4D/CC		-113.5
		NR_TDD_FR1_C	dBm/SC S		-113
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-91.65	-112.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-112
		NR_FDD_FR1_G	1		-111
		NR_FDD_FR1_H	1		-110.5
Ê , /I ot			dB	10	-4
$\hat{E}_{s}/N_{oc}$	I	T., :	dB	10	-4
	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-121
		NR_FDD_FR1_B	dBm/SC		-120.5
SS-		NR_TDD_FR1_C			-120
		NR_FDD_FR1_D NR_TDD_FR1_D		-84.65	-119.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-119
		NR_FDD_FR1_G			-118
RSRP <sup>Not</sup>		NR_FDD_FR1_H			-117.5
e3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	S		-118
		NR_FDD_FR1_B	1		-117.5
		NR_TDD_FR1_C	j		-117
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-81.65	-116.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-116
		NR_FDD_FR1_G	1		-115
		NR_FDD_FR1_H	1		-114.5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-87.76
		NR_FDD_FR1_B	1		-87.26
	Confic	NR_TDD_FR1_C	dBm/		-86.76
	Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/ 9.36MHz	-56.28	-86.26
lo <sup>Note3</sup>		NR_FDD_FR1_E NR_TDD_FR1_E			-85.76
		NR_FDD_FR1_G			-84.76
		NR_FDD_FR1_H	1		-84.26
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/		-84.76
	Config 3,6	NR_FDD_FR1_B	38.16MH	-50.19	-84.26
		NR_TDD_FR1_C	Z		-83.76
		NR_FDD_FR1_D			-83.26

	NR_TDD_FR1_D			
	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	ion condition	-	AW	/GN
Antenna d	configuration	-	1:	x2
Note 1:	OCNG shall be used such that both	cells are ful	ly allocated and a co	nstant total
	transmitted power spectral density is	s achieved f	or all OFDM symbols	S.
Note 2:	Interference from other cells and no	ise sources	not specified in the to	est is assumed to
	be constant over subcarriers and tin	ne and shall	be modelled as AW	GN of appropriate
	power for $_N$ to be fulfilled.			
Note 3:	SS-RSRP, and lo levels have been	derived from	other parameters for	or information
	purposes. They are not settable par		•	
Note 4:				ent interference and
	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 5:	NR operating band groups are as de		use 3.5.2.	
Note 6:	The test configuration excludes sup			guired to run this
	test on band n51 in this release of the	•		7

#### 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. Absolute 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	Offic	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
BW <sub>channel</sub>	MHz	100: N <sub>RB,c</sub> = 66	100: $N_{RB,c} = 66$
Downlink initial BWP configuration		DLBWP.0.1	
Uplink initial BWP configuration		ULBWP.0.1	
DRX cycle configuration	ms	Not applicable	
PDSCH Reference measurement channel		•	•
RMSI CORESET Reference Channel		•	•
OCNG Patterns		OP.1	OP.1

SMTC configuration		SMTC.1	SMTC.1
SSB configuraiton		SSB.3 FR2	SSB.3 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			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
Parameter	Onit	Cell 2	Cell 2
		Setup 1	Setup 1
Angle of arrival configuration		according to	according to
		A.3.15.1	A.3.15.1
Assumption for UE beams <sup>Note 10</sup>		Rough	Rough
N <sub>oc</sub> Note1	dBm/15kHz Note4	-105	N/A
N <sub>oc</sub> Note1	dBm/SCS Note4	-96	N/A
			(Table B.2.3-2 Rx
	dBm/SCS		Beam Peak
Es	Note4		+1dB)
			(Note 7)
$\hat{E}_s/N_{oc}$	dB	11	N/A
			(Table B.2.3-2 Rx
	dBm/SCS		Beam Peak
SSB_RP <sup>Note2</sup>	Note4	-85	+1dB)
			(Note 7)
$\hat{E}_{\rm s}/I_{ m ot}_{ m BB}$ Note 2, Note 9	dB	9.97	-3.81
			(Table B.2.3-2 Rx
. Nata	dBm/95.04		Beam Peak
Io <sup>Note2</sup>	MHz Note4	-55.65	+30dB)
			(Note 8)
Note As AMbana and Satarfanana for			(Note o)

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for  $N_{oc}$  to be fulfilled.

Note 2: SSB\_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

Note 5: Void Note 6: Void

Note 7:	SSB_RP is applied at 1dB above the minimum level specified in Table B.2.3-2 for beam
	peak.
Note 8:	lo is applied at 10logg/(792)dR+1dR above the minimum level specified in Table R 2.3-2

Note 8: Io is applied at 10log<sub>10</sub>(792)dB+1dB above the minimum level specified in Table B.2.3-2 for beam peak.

Note 9: Calculation of Es/lot<sub>BB</sub> 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 1dB for UE multi-band relaxation factor ΔMB<sub>P</sub> from TS 38.101-2 [19] Table

6.2.1.3-4.

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

#### 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

Param	eter	Unit	Tes	st 1 II 2		st 2		st 3 ell 2
SSB ARFCN			fre			q1		eq1
	Config 1,4			7.		DD		- 1
Duplex mode	Config 2,3,5,6		TDD					
	Config 1,4		Not Applicable					
TDD configuration	Config 2,5	1			TDDC	onf.1.1		
	Config 3,6	1			TDDC	onf.2.1		
Downlink initial BWP co	1				DLBV	VP.0.1		
Uplink initial BWP config	juration				ULB\	VP.0.1		
DRX Cycle configuration	1	ms			Not Ap	plicable		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5			-		-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5			-		-		-
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5			-		-		-
	Config 3,6							
OCNG Patterns			OP.1					
SS-RSSI-Measurement			Not Applicable					
SMTC configruation					SM	TC.1		
	Config 1,2,4,5				SSB.	1 FR1		
SSB configuration	Config 3,6	1			SSB	2 FR1		
DD0011/DD0011	Config 1,2,4,5					15		
PDSCH/PDCCH subcarrier spacing	Config 3,6	kHz				30		
EPRE ratio of PSS to SSS	Coming 5,5			1		J	1	
EPRE ratio of PBCH DMRS	S to SSS	†						
EPRE ratio of PBCH to PB	CH DMRS							
EPRE ratio of PDCCH DMI								
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 P								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
Note2 Config	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k	-80	-80.18 -106			116	
1,2,4,5	NR_FDD_FR1_B	Hz		-	]			15.5
	NR_TDD_FR1_C							115

		ND EDD ED: 5	ı		1	1
		NR_FDD_FR1_D NR_TDD_FR1_D				-114.5
		NR_FDD_FR1_E				-114.5
		NR_TDD_FR1_E				-114
		NR_FDD_FR1_G				-113
		NR_FDD_FR1_H				-112.5
	Config 3,6			-86.27	-113	Same as Noc for Config 1,2,4,5
	Config 1,2,4	,5		-80.18	-106	Same as Noc for
		NR_FDD_FR1_A	1			15kHz
		NR_TDD_FR1_A				-113
		NR_FDD_FR1_B	1			-112.5
Note2		NR_TDD_FR1_C	dBm/SC			-112
	Config 3,6	NR_FDD_FR1_D	S	-83.27	-110	
		NR_TDD_FR1_D				-111.5
		NR_FDD_FR1_E				
		NR_TDD_FR1_E	<b>.</b>			-111
		NR_FDD_FR1_G	-			-110
Ê , /I ot		NR_FDD_FR1_H	dB	-1.75	-1.75	-109.5 -1.75
$\hat{E}_{s}/I_{ot}$ $\hat{E}_{s}/N_{oc}$			dB	-1.75	-1.75	-1.75
L s / IV oc		NR_FDD_FR1_A	ub ub	-1.75	-1.73	-1.73
	Config 1,2,4,5	NR_TDD_FR1_A				
		NOTE 6			-107.75	-117.75
		NR_FDD_FR1_B		04.00		-117.25
		NR_TDD_FR1_C				-116.75
		NR_FDD_FR1_D		-81.93		
		NR_TDD_FR1_D				-116.25
		NR_FDD_FR1_E NR_TDD_FR1_E				445.75
		NR_FDD_FR1_G	}			-115.75 -114.75
SS-		NR_FDD_FR1_H	dBm/SC			-114.75
RSRP <sup>Not</sup>		NR_FDD_FR1_A	S			114.20
63		NR_TDD_FR1_A				
		NOTE 6				-114.75
		NR_FDD_FR1_B	<u> </u>			-114.25
	Config 2 6	NR_TDD_FR1_C	<u> </u>	95.00	-111.75	-113.75
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-111.75	-113.25
		NR FDD FR1 E				-110.20
		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 NR_FDD_FR1_D	dB	-14.77	-40.59	-14.76
ייייייייייייייייייייייייייייייייייייייי		NR_TDD_FR1_D	ub	- 17.77		- 1-1.70
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
		NR_FDD_FR1_A				
lo <sup>Note3</sup>	Config	NR_TDD_FR1_A	dBm/	-50	-75.83	-85.83
	1,2,4,5	NOTE 6	9.36MHz	30	7 0.00	05.55
		NR_FDD_FR1_B				-85.33

		ND TDD ED1 C				04.02
		NR_TDD_FR1_C	-			-84.83
		NR_FDD_FR1_D				-84.33
		NR_TDD_FR1_D	]			-04.55
		NR_FDD_FR1_E				00.00
		NR_TDD_FR1_E				-83.83
		NR_FDD_FR1_G				-82.83
		NR_FDD_FR1_H	]			-82.33
		NR_FDD_FR1_A				
		NR TDD FR1 A				-79.73
		NOTE 6				
		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	70.00
		NR_TDD_FR1_D	z			-78.23
		NR_FDD_FR1_E				77.70
		NR_TDD_FR1_E				-77.73
		NR_FDD_FR1_G	1			-76.73
		NR_FDD_FR1_H	]			-76.53
Propagatio	n condition	<u> </u>	-	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  $N_{max}$  to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

#### A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

#### A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

#### A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

#### A.8.5.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2-1. In this test case there are two cells on different carriers. Absolute 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.8.5.2.2.2.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	figuration Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.8.5.2.2.2-2: SS-RSRQ Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	
Parameter	Onit	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW <sub>channel</sub>	MHz	100: N <sub>RB,c</sub> = 66	100: $N_{RB,c} = 66$	
Downlink initial BWP configuration		DLBV	/P.0.1	
Uplink initial BWP configuration		ULBV	/P.0.1	
DRX cycle configuration	ms	Not ap	olicable	
PDSCH Reference measurement channel		-	-	
RMSI CORESET Reference Channel		-	-	
OCNG Patterns		OP.1	OP.1	
SMTC configuration		SMTC.1	SMTC.1	
SSB configuration		SSB.3 FR2	SSB.3 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				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.2.2-3: SS-RSRQ Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
Parameter	Onit	Cell 2	Cell 2
		Setup 1	Setup 1
Angle of arrival configuration		according to	according to
		A.3.15.1	A.3.15.1
Assumption for UE beams <sup>Note 10</sup>		Rough	Rough
$N_{oc}^{}$ Note1	dBm/15kHz Note4	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB)
			(Note 7)
$N_{oc}^{$	dBm/SCS Note4	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
$\hat{E}_s/N_{oc}$	dB	-0.5	-1.75
SSB_RPNote2	dBm/SCS Note4	-96.2	(Table B.2.3-2 Rx Beam Peak +2.25dB) (Note 8)
SS-RSRQ <sup>Note2</sup>	dB	-3.27	-14.82
$\hat{E}_{s}/I_{ot}$ Note2	dB	-0.5	-1.75

lo <sup>Note2</sup>		dBm/95.04 MHz <sup>Note4</sup>	-63.95	(Table B.2.3-2 Rx Beam Peak +35.22dB)
Note 1:	Interference from other cells and	noise sources n	I ot specified in the tes	1
	constant over subcarriers and tim			
	for $N_{oc}$ to be fulfilled.			
Note 2:	SSB_RP, SS-RSRQ, Es/lot and I information purposes. They are n			r parameters for
Note 3:	Void	•		
Note 4:	Equivalent power received by an	antenna with 0d	Bi gain at the centre	of the quiet zone.
Note 5:	Void			
Note 6:	Void			
Note 7:	N <sub>oc</sub> for SCS 15kHz is applied at - Table B.2.3-2 for beam peak. N <sub>oc</sub>			
	level specified in Table B.2.3-2 fo	r beam peak.		
Note 8:	SSB_RP is applied at 2.25dB above beam peak.	ove the minimum	n level specified in Ta	ble B.2.3-2 for
Note 9:	lo is applied at 10log <sub>10</sub> (792)+6.22 for beam peak.	dB above the m	inimum level specifie	d in Table B.2.3-2
Note 10:	Information about types of UE be implementation or test system im	•	.2.1.3, and does not I	imit UE

#### 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

Paramo	eter	Unit	Tes	st 1 II 2		st 2		st 3 ell 2
SSB ARFCN			fre		fre			eq1
Duplex mode	Config 1,4					DD		
B uplox mode	Config 2,3,5,6					DD		
	Config 1,4	<u> </u>	Not Applicable					
TDD configuration	Config 2,5				TDDC	onf.1.1		
	Config 3,6				TDDC	onf.2.1		
Downlink initial BWP cor					DLBV	VP.0.1		
Uplink initial BWP config	uration				ULBV	VP.0.1		
DRX Cycle configuration	1	ms			Not Ap	plicable		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5			-		-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5			-	-		-	
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5			-		-		-
	Config 3,6							
OCNG Patterns					0	P.1		
SS-RSSI-Measurement					Not Ap	plicable		
SMTC configruation					SM	TC.1		
000 (1 11	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 SS	•				T `			
EPRE ratio of PBCH DM	IRS to SSS	1						
EPRE ratio of PBCH to I								
EPRE ratio of PDCCH D			_	_	_	_	_	_
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 D								
EPRE ratio of OCNG DN		-						
EPRE ratio of OCNG to		†						
Note2 Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k Hz	-8	38	-10	8.5	-1	19.5
1,2,7,0	NR_FDD_FR1_B	1 12					-1	19

		NR_TDD_FR1_C				-118.5	
		NR_FDD_FR1_D				-118	
		NR_TDD_FR1_D	_			-110	
		NR_FDD_FR1_E				-117.5	
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-116.5	
		NR_FDD_FR1_H				-116	
	Config 1,2,4	.5		-88	-108.5	Same as Noc for	
	<b>.</b>		=			15kHz	
		NR_FDD_FR1_A NR_TDD_FR1_A				-116.5	
		NOTE 6				-110.5	
		NR_FDD_FR1_B	-	-116			
Note2		NR TDD FR1 C	dBm/SC			-115.5	
IV oc	Config 3,6	NR_FDD_FR1_D	S	-85	-105.5		
	, , , , , , , , , , , , , , , , , , ,	NR_TDD_FR1_D				-115	
		NR_FDD_FR1_E				444.5	
		NR_TDD_FR1_E				-114.5	
		NR_FDD_FR1_G				-114.5	
		NR_FDD_FR1_H				-113	
Ê , /I ot			dB	-1.75	20	-4.0	
$\hat{E}_{s}/N_{oc}$	T	T.,	dB	-1.75	20	-4.0	
		NR_FDD_FR1_A				400.5	
		NR_TDD_FR1_A				-123.5	
				-89.75	-88.5	-123	
	Config 1,2,4,5	NR_FDD_FR1_B NR_TDD_FR1_C				-123	
		NR_FDD_FR1_D				-122.5	
		NR_TDD_FR1_D				-122	
		NR_FDD_FR1_E					
		NR_TDD_FR1_E				-121.5	
00		NR_FDD_FR1_G				-120.5	
SS- RSRP <sup>Not</sup>		NR_FDD_FR1_H	dBm/SC			-120	
e3		NR_FDD_FR1_A	S				
		NR_TDD_FR1_A					-120.5
		NOTE 6	<u> </u>		-		
		NR_FDD_FR1_B				-120	
	0 " 00	NR_TDD_FR1_C	-			-119.5	
	Config 3,6	NR_FDD_FR1_D		-86.75	-85.5	-119	
		NR_TDD_FR1_D					
		NR_FDD_FR1_E NR_TDD_FR1_E				-118.5	
		NR_FDD_FR1_G	1			-117.5	
		NR_FDD_FR1_H	1			-117.5	
	1	NR_FDD_FR1_A					
		NR_TDD_FR1_A					
		NOTE 6	]				
		NR_FDD_FR1_B	]				
		NR_TDD_FR1_C	[				
SS-SINR N	lote3	NR_FDD_FR1_D	dB	-1.75	20	-4.0	
		NR_TDD_FR1_D					
		NR_FDD_FR1_E					
		NR_TDD_FR1_E					
		NR_FDD_FR1_G	<u> </u>				
		NR_FDD_FR1_H					
		NR_FDD_FR1_A NR_TDD_FR1_A				-90.09	
Io <sup>Note3</sup>	Config	NOTE 6	dBm/	-57.83	-60.5	-30.03	
10	1,2,4,5	NR_FDD_FR1_B	9.36MHz	-J1.03	-00.5	-89.59	
		NR_TDD_FR1_C	1			-89.09	
L		<u> </u>	1	l .	l	55.00	

		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				-84
		NOTE 6				
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C	dBm/			-83
	Config 3,6	NR_FDD_FR1_D	38.16MH	-51.73	-54.41	00.5
		NR_TDD_FR1_D	z			-82.5
		NR_FDD_FR1_E				-82
		NR_TDD_FR1_E				-62
		NR_FDD_FR1_G				-81
		NR_FDD_FR1_H	]			-80.5
Propagatio	n 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  $N_{N_{out}}$  to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

#### A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

#### A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

#### A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

#### A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Absolute 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

Parameter	Unit	Test 1	Test 2	Test 3

	Cell 2	Cell 2	Cell 2
	Freq1	freq1	freq1
	TDD	TDD	TDD
	TDDConf.3.1	TDDConf.3.1	TDDConf.3.1
MHz	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66	100: N <sub>RB,c</sub> = 66
		DLBWP.0.1	
		ULBWP.0.1	
ms		Not applicable	
	-	-	-
	-	-	-
	OP.1	OP.1	OP.1
	SMTC.1	SMTC.1	SMTC.1
	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
kHz	120	120	120
dB	0	0	0
	ms kHz	Freq1 TDD TDDConf.3.1 MHz 100: N <sub>RB,c</sub> = 66  ms	Freq1 freq1 TDD TDD TDD TDDConf.3.1 TDDConf.3.1  MHz 100: N <sub>RB,c</sub> = 66 100: N <sub>RB,c</sub> = 66 DLBWP.0.1 ULBWP.0.1 Not applicable OP.1 OP.1  SMTC.1 SMTC.1 SSB.3 FR2 SSB.3 FR2 kHz 120 120

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

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
Parameter	Unit	Cell 2	Cell 2	Cell 2
		Setup 1	Setup 1	Setup 1
Angle of arrival configuration		according to	according to	according to
		A.3.15.1	A.3.15.1	A.3.15.1
Assumption for UE beams <sup>Note 10</sup>		Rough	Rough	Rough
$N_{oc}^{-{ m Note1}}$	dBm/15kHz Note4	-104.7	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)
$N_{oc}^{ m Note1}$	dBm/SCS Note4	-95.7	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
$\hat{E}_s/N_{oc}$	dB	-0.5	11	-1.0
SSB_RPNote2	dBm/SCS Note4	-96.2	-84.7	(Table B.2.3-2 Rx Beam Peak +3dB) (Note 8)
SS-SINR <sup>Note2</sup>	dB	-0.5	11	-1.0
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ Note2	dB	-0.5	11	-1.0
Io <sup>Note2</sup>	dBm/95.04 MHz <sup>Note4</sup>	-63.95	-55.38	(Table B.2.3-2 Rx Beam Peak +35.54dB)

					(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 AV	VGN of appropriate p	ower for $N_{oc}$ to be f	ulfilled.				
Note 2:	SSB_RP, SS-SINR, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.								
Note 3:	Void								
Note 4:	Equivalent power received by an	antenna with 0 o	dBi gain at the centre	of the quiet zone.					
Note 5:	Void		· ·	·					
Note 6:	Void								
Note 7:	N <sub>oc</sub> for SCS 15kHz is applied at -10log <sub>10</sub> (8)+4dB above the minimum level specified in Table B.2.3-2 for beam peak. N <sub>oc</sub> for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak.								
Note 8:	SSB_RP is applied at 3dB above	the minimum le	vel specified in Table	B.2.3-2 for beam pea	ak.				
Note 9:	lo is applied at level 10log <sub>10</sub> (792)-								
Note 10:	Information about types of UE beautimplementation.	am is given in B	.2.1.3, and does not I	imit UE implementation	on or test system				

#### 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 <sub>SSB</sub>	
Parameter	NK operating band groups	SCS <sub>SSB</sub> = 15	SCS <sub>SSB</sub> = 30	dB
	NB EDD EB1 A NB TDD EB1 A	<b>kHz</b> -124	<b>kHz</b> -121	
	NR_FDD_FR1_A, NR_TDD_FR1_A  NR_FDD_FR1_B	-124	-120.5	
	NR_TDD_FR1_C	-123	-120	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1: NF	Roperating band groups are defined in clau	se 3.5.2.		

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

				Mini	mum SSE	ote 3	SSB Ês/lot	
Parameter	Angle of arrival	NR operating bands	SCS <sub>SSB</sub> = 120 kHz  SCS <sub>SSB</sub> = 240 kHz		dBm / SCS <sub>SSB</sub> SCS <sub>SSB</sub> = 120 kHz			dB
			UE Power class			UE Power class		
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>		
Conditions	Rx Beam	n258	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>	(Value for	≥-4
Conditions		n260	- 122.3+Y <sub>1</sub>		-106.5	- 122.8+Y <sub>4</sub>	SCS <sub>SSB</sub> = 120 kHz) +3dB	≥-4
		n261	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>		

	n257	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z <sub>4</sub>		
Spherical	n258	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z <sub>4</sub>	(Value for	
coverage Note 1	n260	- 114.3+Z <sub>1</sub>		-93.9	- 110.8+Z <sub>4</sub>	SCS <sub>SSB</sub> = 120 kHz) +3dB	≥-4
	n261	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z <sub>4</sub>		

- 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 Es/lot, with no applied noise.
- NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB<sub>P,n</sub> and Spherical coverage values are increased by ΔMB<sub>S,n</sub>, 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<sub>1</sub> and Y<sub>4</sub> 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<sub>1</sub> and Z<sub>4</sub> 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

Editor's note:

- The Assumption for UE beams (fine or rough) in Annex A RRM test cases is defined based on power class 3, and unless otherwise stated also applies for other UE power classes

#### B.2.1.3.1 Minimum SSB\_RP values for Rx Beam Peak angle of arrival

Minimum SSB\_RP values in Tables B.2.2-2 and B.2.3-2 are based on reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

 $\label{eq:minimum_SSB_RP} \begin{aligned} &\text{Minimum SSB\_RP} = \text{Reference sensitivity} \, _{PC3, \, n260, \, 50 MHz} + Y \, - 10 Log_{10} (PRB_{Refsens} \, x \, \, 12) - SNR_{Refsens} + SSB \, \hat{E}s/Iot \, + \\ &\Delta MB_{P.n} \end{aligned}$ 

where:

Reference sensitivity PC3, n260, 50MHz is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE power class							
1	2	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<sub>Refsens</sub> 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;

ΔMB<sub>P,n</sub> 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  $(-109.5 + \Delta MB_{P,n})$  dBm/120kHz for intra-frequency measurements and  $(-107.5 + \Delta MB_{P,n})$  dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB\_RP level for power class X (PC\_X) and operating band Y (Band\_Y) is used:

 $For \ Intra-frequency: \ Minimum \ SSB\_RP \ (PC\_X, \ Band\_Y) = -109.5 \ dBm/120kHz + Refsens_{PC\_X, \ Band\_Y, \ 50MHz} - Refsens_{PC\_X,$ 

For Inter-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = -107.5 dBm/120kHz + Refsens  $_{PC_X, Band_Y, 50MHz}$  - Refsens  $_{PC_3, n260, 50MHz}$  +  $Y_{PC_3}$  -  $Y_{PC_3}$  +  $Y_{PC_3}$  -  $Y_{PC$ 

#### B.2.1.3.2 Minimum SSB\_RP values for angle of arrival within Spherical coverage

Minimum SSB\_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB\_RP = EIS spherical coverage  $_{PC3, n260, 50MHz}$  +Z -10Log $_{10}$ (PRB $_{Refsens}$  x 12) - SNR $_{Refsens}$  + SSB  $\hat{E}$ s/Iot +  $\Delta MB_{S,n}$ ,

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<sub>Refsens</sub> 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<sub>Refsens</sub> 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;

ΔMB<sub>S,n</sub> 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  $(-96.9 + \Delta MB_{S,n})$  dBm/120kHz for intra-frequency measurements and is  $(-94.9 + \Delta MB_{S,n})$  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) = -96.9 dBm/120kHz + EIS spherical coverage  $_{PC_X, Band_Y, 50MHz}$  - EIS spherical coverage  $_{PC_X, Band_Y, 50MHz}$ 

For Inter-frequency: Minimum SSB\_RP (PC\_X, Band\_Y) = -94.9 dBm/120kHz + EIS spherical coverage  $_{PC_X, Band_Y, 50MHz}$  - EIS spherical coverage  $_{PC_X, Band_Y, 50MHz}$ 

## B.2.1.4 Gain to SS-RSRP measurement point for FR1

In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP measurement point.

### B.2.1.5 Gain to SS-RSRP measurement point for FR2

#### B.2.1.5.1 Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

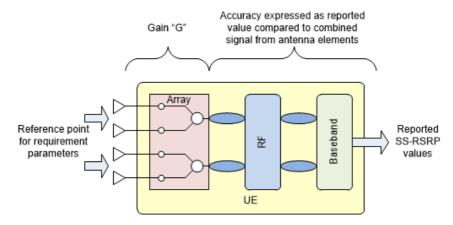


Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

	UE Power class					
	1	2	3	4		
Minimum, dBi	FFS	FFS	-10	FFS		
Maximum, dBi	FFS	FFS	+20	FFS		

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

#### B.2.1.5.2 Gain to SS-RSRP measurement point for different frequency

In any specific direction, the UE gain G may be different depending on frequencies. The gain " $G_{inter}$ " affects relative signal level values reported by the UE when measuring between different frequencies and is specified in Table B.2.1.5.2-1 for each power class.

Table B.2.1.5.2-1: UE gain difference between inter-frequencies Ginter

	UE Power class				
	1	2	3	4	
Maximum difference, dB	FFS	FFS	3	FFS	

#### B.2.1.5.3 Alignment of Rough beam to Rx beam Peak

The definition of Rx Beam Peak in TS 38.101-2 [19] clause 7.3.2 is based on Throughput at Reference sensitivity power level, and assumes use of Fine beams. In many RRM scenarios the UE can use Rough beams, but the largest Rough beam gain direction may not be aligned to the Fine beam Peak direction.

When the Rx Beam Peak is selected and defined based on Fine Beams, the rough beam gain in that direction may be lower than the largest rough beam gain in another direction within Spherical Coverage. The term "D" is the maximum allowed rough beam gain reduction, and is specified in Table B.2.1.5.3-1 for each power class.

Table B.2.1.5.3-1: Rough Beam gain reduction "D" in Rx Beam Peak direction

	UE Power class					
	1	2	3	4		
Maximum gain reduction, dB	FFS	FFS	5.5	FFS		

# 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 Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS <sub>SSB</sub>	
rarameter	NA operating band groups	SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 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	e 3.5.2.		

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

				SSB Ês/lot				
		ND			dBm / SC	SSSB		
Parameter	Angle of arrival	NR operating bands		SCS <sub>SSB</sub> =	= 120 kHz		SCS <sub>SSB</sub> = 240 kHz	40
		Danus		UE pow	er class		UE power class	dB
			1	2	3	4	1, 2, 3, 4	
	Rx Beam Peak	n257	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>	(Value for SCSssb = 120 kHz) +3dB	≥-6
		n258	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>		
		n260	- 125.3+Y <sub>1</sub>		-109.5	- 125.8+Y <sub>4</sub>		
Conditions		n261	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>		
Conditions		n257	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>		
	Spherical	n258	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>	(Value for SCS <sub>SSB</sub> = 120 kHz) +3dB	≥-6
	coverage Note 1	n260	- 117.3+Z <sub>1</sub>		-96.9	- 113.8+Z <sub>4</sub>		2-0
		n261	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>		

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 ΔMB<sub>P,n</sub> and Spherical coverage values are increased by ΔMB<sub>S,n</sub>, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y<sub>1</sub> and Y<sub>4</sub> 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<sub>1</sub> and Z<sub>4</sub> are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

# B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB\_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

Table B.2.3-1: Conditions for inter-frequency measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /	SCS <sub>SSB</sub>	
Farailleter	NA operating band groups	SCS <sub>SSB</sub> = 15	SCS <sub>SSB</sub> = 30	dB
		kHz	kHz	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
Conditions	NR_TDD_FR1_C	-124	-121	> 4
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.		

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

				Minimum SSB_RP Note 2, Note 3								
		ND										
Parameter	Angle of arrival	NR operating bands		SCS <sub>SSB</sub> =	120 kHz		SCS <sub>SSB</sub> = 240 kHz	-15				
		Danus		UE pow	UE power class	dB						
			1	2	3	4	1, 2, 3, 4					
		n257	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>						
	Rx Beam Peak	n258	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>	VH2) ±34B	≥-4				
		n260	- 123.3+Y <sub>1</sub>		-107.5	- 123.8+Y <sub>4</sub>						
Conditions		n261	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>						
Conditions		n257	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>						
	Spherical coverage	n258	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>	(Value for SCS <sub>SSB</sub> = 120	≥-4				
	Note 1	n260	- 115.3+Z₁		-94.9	- 111.8+Z <sub>4</sub>	kHz) +3dB					
		n261	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>		i .				

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 ΔMB<sub>P,n</sub> and Spherical coverage values are increased by ΔMB<sub>S,n</sub>, 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.2.3-2:

<sup>-</sup> The value of Y for power classes 1 and 4 is FFS, where Y<sub>1</sub> and Y<sub>4</sub> 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<sub>1</sub>, and Z<sub>4</sub> 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 Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS <sub>SSB</sub>	
rarameter	ian operating band groups	SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 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	3.5.2.	•	

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

				SSB Ês/lot									
		NR		dBm / SCS <sub>SSB</sub>									
Parameter	Angle of arrival	operating		SCS <sub>SSB</sub> =	120 kHz		SCS <sub>SSB</sub> = 240 kHz	dB					
		bands		UE pow	er class		UE power class	иь					
			1	2	3	4	1, 2, 3, 4						
	Rx Beam Peak	n257	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>		≥-3					
		n258	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>	SCSSSB = 120 kHz) ±3dB						
		n260	- 122.3+Y <sub>1</sub>		-106.5	- 122.8+Y <sub>4</sub>							
Conditions		n261	- 125.3+Y <sub>1</sub>	-110.8	-109.1	- 124.8+Y <sub>4</sub>							
Conditions		n257	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z₄							
	Spherical coverage Note 1	n258	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z <sub>4</sub>	(Value for SCS <sub>SSB</sub> = 120	≥-3					
		n260	- 114.3+Z <sub>1</sub>		-93.9	- 110.8+Z <sub>4</sub>	kHz) +3dB						
		n261	- 117.3+Z <sub>1</sub>	-99.8	-98.2	- 115.8+Z <sub>4</sub>							

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  $\Delta MB_{P,n}$  and Spherical coverage values are increased by  $\Delta MB_{S,n}$ , 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  $Y_1$  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<sub>1</sub> and Z<sub>4</sub> 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

	NP operating		Minimum CSI-RS_RP		CSI-RS Ês/lot
Parameter	NR operating band groups <sup>Note1</sup>		dBm / SCS <sub>CSI-RS</sub>		dB
	band groups	SCS <sub>CSI-RS</sub> = 15 kHz	SCS <sub>CSI-RS</sub> = 30 kHz	SCS <sub>CSI-RS</sub> = 60 kHz	uБ
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A,	-124	-121	-118	
	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,	400 E	110 5	446 E	≥ -3
	NR_TDD_FR1_D	-122.5	-119.5	-116.5	
	NR_FDD_FR1_E,	-122	-119	-116	
	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 4: NE		a ana datina di la alazza	0.5.0		

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

				Minimum CSI-RS_RP Note 2, Note 3									
Davamatav		NR		dBm / SCS <sub>CSI-RS</sub>									
Parameter	Angle of arrival	operating bands		SCS <sub>CSI-RS</sub> = 60 kHz  SCS <sub>CSI-RS</sub> = 120  kHz			SCS <sub>CSI-RS</sub> = 120 kHz	٩D					
		Danus		UE pow	er class	UE power class	dB						
			1	2	3	4	1, 2, 3, 4						
		n257	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>		≥-3					
	Rx Beam Peak	n258	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>	(Value for SCS <sub>CSI-RS</sub> = 60 kHz) +3dB						
		n260	- 125.3+Y <sub>1</sub>		-109.5	- 125.8+Y <sub>4</sub>							
Conditions		n261	- 128.3+Y <sub>1</sub>	-113.8	-112.1	- 127.8+Y <sub>4</sub>							
Conditions		n257	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>							
	Spherical coverage	n258	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>	(Value for SCScsi-Rs = 60	≥-3					
	Note 1	n260	- 117.3+Z <sub>1</sub>		-96.9	- 113.8+Z <sub>4</sub>	kHz) +3dB	≥-3					
		n261	- 120.3+Z <sub>1</sub>	-102.8	-101.2	- 118.8+Z <sub>4</sub>							

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 ΔMB<sub>P,n</sub> and Spherical coverage values are increased by ΔMB<sub>S,n</sub>, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.2-2:

- The value of Y for power classes 1 and 4 is FFS, where  $Y_1$  and  $Y_4$  are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z<sub>1</sub> and Z<sub>4</sub> are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

# B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB\_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm / S	SCS <sub>SSB</sub>	dB
		SCS <sub>SSB</sub> = 15 kHz	SCS <sub>SSB</sub> = 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	depending band groups are defined in clause	3.5.2.		•

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

				SSB Ês/lot									
		ND		dBm / SCS <sub>SSB</sub>									
Parameter	Angle of arrival	NR operating		SCS <sub>SSB</sub> =	: 120 kHz		SCS <sub>SSB</sub> = 240 kHz	40					
		bands		UE pow	UE power class	dB							
			1	2	3	4	1, 2, 3, 4						
		n257	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>		≥-4					
	Rx Beam Peak	n258	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>	SCSSSB = 120						
		n260	- 123.3+Y <sub>1</sub>		-107.5	- 123.8+Y <sub>4</sub>							
Conditions		n261	- 126.3+Y <sub>1</sub>	-111.8	-110.1	- 125.8+Y <sub>4</sub>							
Conditions		n257	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>							
	Spherical	n258	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>	(Value for SCS <sub>SSB</sub> = 120	≥-4					
	coverage Note 1	n260	- 115.3+Z₁		-94.9	- 111.8+Z <sub>4</sub>	kHz) +3dB	=-4					
		n261	- 118.3+Z <sub>1</sub>	-100.8	-99.2	- 116.8+Z <sub>4</sub>							

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 ΔMB<sub>P,n</sub> and Spherical coverage values are increased by ΔMB<sub>S,n</sub>, 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.2.5.2-2:

- 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<sub>1</sub> and Z<sub>4</sub> are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively
- B.2.6 Void

B.2.6.1 Void

**Table B.2.6.1-1: Void** 

Table B.2.6.1-2: Void

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  $\Delta$  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  $\Delta$ =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  $\Delta$  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  $\Delta$ =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  $\Delta$  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  $\Delta$ =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  $\Delta$  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	
2017-09	Date			CR	Rev	Cat	Subject/Comment	New version
Capture TPs approved in the meeting		RAN4#83	R4-1706324					
AH #3   A								
Section		AH #3						
2017-12	2017-10	-	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12   RAN#78   RP-180264   0032   B   CR to TS 38.133 : Implementation of endorsed draft CRs from RAN# 4806   RP-181075   0037   B   CR to TS 38.133 : Implementation of endorsed draft CRs from RAN# 4806   RP-181076   0037   B   CR to TS 38.133 : Implementation of endorsed draft CRs from RAN# 4806   RAN# 487   RP-181263   0057   3 B   CR to TS 38.133 : Implementation of endorsed draft CRs from RAN# 4806   RAN# 487   RAN# 480   RAN# 487   RAN# 480   RAN# 487   RAN# 480   RAN#	2017-12	RAN4#85						0.4.0
15.10			RP-172407					
2018-06   RAN#80   RP-181075   0037   B   CR to TS 38.133: Implementation of endorsed draft CRs from RAN#86   RAN#87   RAN#86   RAN#87   RAN#88								
RANW #86bis and RANW #87   15.3.0   1								
RANH-AH-1807 and RANH #88							RAN4 #86bis and RAN4 #87	
2019-12   RAN#86   RP-182763   0057   3   B   CR to TS 38.133: Implementation of endorsed draft CRs from   15.4.0   RAN#885   RP-190569   0064   1   B   CR to TS 38.133: Implementation of endorsed draft CRs from   15.5.0   RAN#8486   RP-191240   0072   1   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.6.0   RAN#8490	2018-09	RAN#81	RP-181896	0043		В		15.3.0
2019-03   RAN#83   RP-190569   0064   1   B   CR to TS 38.133: implementation of endorsed draft CRs from   15.5.0   RAN#8480   RP-191240   0072   1   F   CR to TS 38.133: implementation of endorsed draft CRs from   15.6.0   RAN#8480   RP-192022   0084   F   CR to TS 38.133: implementation of endorsed draft CRs from   15.6.0   RAN#868   RP-1930042   0089   F   CR to TS 38.133: implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-1930042   0090   F   CR to TS 38.133: implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-1930042   0090   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-1930042   0090   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-1930042   0090   F   CR to 38.133: Implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-1930042   0090   F   CR to 38.133: Implementation of endorsed draft CRs from   15.7.0   RAN#868   RP-192997   0090   F   CR to 38.133: Implementation of endorsed draft CRs from   15.8.0   RAN#868   RP-192997   0090   F   CR to 38.133: Implementation of endorsed draft CRs from   15.8.0   RAN#868   RP-192997   0094   F   CR to 38.133: Implementation of endorsed draft CRs from   15.8.0   RAN#868   RP-192997   0094   F   CR to 38.133: Implementation of endorsed draft CRs from   15.8.0   RAN#868   RP-192997   0096   F   Update of Parameters, Test case A.7.7.1.1   FR2 Intra-frequency   15.8.0   SS-RSRP accuracy   SS-RSRP accuracy   15.8.0   SS-RSRP accuracy   15.8.0   SS-RSRP accuracy   15.8.0   RP-192994   0100   F   CR on handover 38.133   To street on the SWP switch test cases EN-DC FR2 (clause A.4.5.6)   15.8.0   CR on the SWP switch test cases EN-DC FR2 (clause A.5.5.6)   15.8.0   CR on the SWP switch test cases SA-R72 (clause A.5.5.6)   15.8.0   CR on the SWP switch test cases SA-R72 (clause A.5.5.6)   15.8.0   CR on the SWP switch test cases SA-R72 (clause A.5.5.6)   15.8.0   CR on the SWP switch test cases SA-R72 (clause A.5.5.6)   15.8.0   CR on the SWP switch test	2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from	15.4.0
2019-06   RAN#84   RP-191240   0072   1   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.6.0   RAN#895   RP-192022   0084   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.7.0   2019-12   RAN#86   RP-193039   0089   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.7.0   2019-12   RAN#86   RP-193042   0090   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.7.0   2019-12   RAN#86   RP-193042   0090   F   CR to TS 38.133: Implementation of endorsed draft CRs from   15.8.0   2019-12   RAN#86   RP-192997   0092   1   F   Specification of UE antenna gain range   15.8.0   2019-12   RAN#86   RP-192997   0092   1   F   Specification of UE antenna gain range   15.8.0   2019-12   RAN#86   RP-192997   0096   F   Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency   15.8.0   2019-12   RAN#86   RP-192997   0100   F   Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency   SS-RSRP accuracy   Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency   SS-RSRP accuracy   SS-RS	2019-03	RAN#83	RP-190569	0064	1	В	CR to TS 38.133: Implementation of endorsed draft CRs from	15.5.0
SAN#86   RP-192022   0084	2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from	15.6.0
2019-12   RAN#86   RP-193042   0090   F   Correction to the starting point of the DRX cycle length interval   15.8.0   2019-12   RAN#86   RP-193042   0090   F   CR to 38.133 R15 Add the missing units to DRX cycle values   15.8.0   2019-12   RAN#86   RP-192997   0092   1   F   Specification of UE antenna gain range   15.8.0   15.8.0   2019-12   RAN#86   RP-192997   0094   F   Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak and 1 in non Rx beam peak   15.8.0   2019-12   RAN#86   RP-192997   0096   F   Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency   15.8.0   SS-RSRP accuracy   SS-RSRP accur	2019-09	RAN#85	RP-192022	0084		F	CR to TS 38.133: Implementation of endorsed draft CRs from	15.7.0
2019-12         RAN/866         RP-193042         0090         F         CR to 38.133 R15 Add the missing units to DRX cycle values         15.8.0           2019-12         RAN/866         RP-192997         0092         1         F         Specification of UE antenna gain range         15.8.0           2019-12         RAN/86         RP-192997         0096         F         Specification of UE antenna gain range         15.8.0           2019-12         RAN/86         RP-192997         0096         F         Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency         15.8.0           2019-12         RAN/86         RP-192997         0100         F         Update of Parameters, Test case A.7.7.1.2 FR2 Intra-frequency         15.8.0           2019-12         RAN/86         RP-192997         0102         F         Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency         15.8.0           2019-12         RAN/86         RP-192997         0102         F         Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency         15.8.0           2019-12         RAN/86         RP-192997         0102         F         Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency         15.8.0           2019-12         RAN/86         RP-1929992         0104         F         Correction to Random	2010-12	RAN#86	RP-103030	0080		F		15.8.0
2019-12   RAN#86   RP-192997   0092   1   F   Specification of UE antenna gain range   15.8.0								
2019-12   RAN#86   RP-192992   0094   F   Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0   non Rx beam peak   15.8.0					1			
Description   Content of Parameters   Test case A.7.7.1.1 FR2 Intra-frequency   SS-RSRP accuracy   SS-RSRP							Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in	
December 2019-12   RAN#86   RP-192997   0098   F   Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency   15.8.0   SS-RSRP accuracy   SS-RSRP accuracy   SS-RSRP accuracy   15.8.0   15.8.0   15.8	2019-12	RAN#86	RP-192997	0096		F	Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency	15.8.0
2019-12   RAN#86   RP-192997   0100   F   Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency SS-RSRP accuracy   SS-RSRP accuracy   15.8.0	2019-12	RAN#86	RP-192997	0098		F	Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency	15.8.0
2019-12   RAN#86   RP-192992   0102   F   Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency SS-RSRP accuracy   15.8.0	2019-12	RAN#86	RP-192997	0100		F	Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency	15.8.0
2019-12   RAN#86   RP-192992   0104   F   Correction to Random access test case in FR1 for PSCell in ENDC	2019-12	RAN#86	RP-192997	0102		F	Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency	15.8.0
2019-12         RAN#86         RP-193040         0106         F         CR on handover 38.133         15.8.0           2019-12         RAN#86         RP-192994         0108         F         CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0109         F         CR on the BWP switch test cases EN-DC FR2 (clause A.5.6.6)         15.8.0           2019-12         RAN#86         RP-192994         0110         F         CR on the BWP switch test cases SA FR1 (clause A.6.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0111         F         CR on the BWP switch test cases SA FR2 (clause A.7.5.6)         15.8.0           2019-12         RAN#86         RP-193042         0116         F         CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)         15.8.0           2019-12         RAN#86         RP-193040         0120         F         CR to nade traces for RRM requirement (clause 6.1.1.5) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0122         F         CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.7.3.2.3) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0128         F	2019-12	RAN#86	RP-192992	0104		F	Correction to Random access test case in FR1 for PSCell in EN-	15.8.0
2019-12         RAN#86         RP-192994         0108         F         CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0109         F         CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0110         F         CR on the BWP switch test cases SA FR1 (clause A.6.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0111         F         CR on the BWP switch test cases SA FR2 (clause A.7.5.6)         15.8.0           2019-12         RAN#86         RP-193042         0116         F         CR on the BWP switch test cases SA FR2 (clause A.7.5.6)         15.8.0           2019-12         RAN#86         RP-193042         0116         F         CR on test cases for Endergree of CR on test Cases SA FR2 (clause A.7.3.1) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0120         F         CR on handover RRM requirement (clause 6.1.1.5) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0126         F         CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.1) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0126         F <td>2019-12</td> <td>RAN#86</td> <td>RP-193040</td> <td>0106</td> <td></td> <td>F</td> <td></td> <td>15.8.0</td>	2019-12	RAN#86	RP-193040	0106		F		15.8.0
2019-12         RAN#86         RP-192994         0109         F         CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0110         F         CR on the BWP switch test cases SA FR1 (clause A.6.5.6)         15.8.0           2019-12         RAN#86         RP-192994         0111         F         CR on the BWP switch test cases SA FR2 (clause A.7.5.6)         15.8.0           2019-12         RAN#86         RP-193042         0116         F         CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)         15.8.0           2019-12         RAN#86         RP-193040         0120         F         CR on handover RRM requirement (clause 6.1.1.5) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0122         F         CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.7.3.2.3) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0126         F         CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0128         F         CR on test cases for FR2 handover (clause A.7.3.1) (R15)         15.8.0           2019-12         RAN#86         R								
2019-12         RAN#86         RP-192994         0111         F         CR on the BWP switch test cases SA FR2 (clause A.7.5.6)         15.8.0           2019-12         RAN#86         RP-193042         0116         F         CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)         15.8.0           2019-12         RAN#86         RP-193040         0120         F         CR on handover RRM requirement (clause 6.1.1.5) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0122         F         CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0126         F         CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0128         F         CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)         15.8.0           2019-12         RAN#86         RP-193042         0130         F         CR on test cases for RP2 handover (clause A.7.3.1) (R15)         15.8.0           2019-12         RAN#86         RP-193042         0130         F         CR to 38.133 on TCI state switching (Clause 8.10) (R15)         15.8.0           2019-12	2019-12			0109		F		
2019-12   RAN#86   RP-193042   0116   F   CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)   15.8.0	2019-12	RAN#86	RP-192994	0110		F	CR on the BWP switch test cases SA FR1 (clause A.6.5.6)	15.8.0
Changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)								
RAN#86   RP-192994   0122   F   CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R15)   (clause A.5.6.2) (R15)   (clause A.5.6.2) (R15)   (clause A.7.3.2.3) (R15)   (clause A.7.3.2.3) (R15)   (clause A.7.3.2.3) (R15)   (clause A.7.3.1) (R15)	2019-12	RAN#86	RP-193042	0116		F		15.8.0
Clause A.5.6.2) (R15)   2019-12	2019-12		RP-193040	0120		F		15.8.0
Clause A.7.3.2.3) (R15)	2019-12	RAN#86	RP-192994	0122		F		15.8.0
2019-12         RAN#86         RP-192994         0128         F         CR on test cases for FR2 handover (clause A.7.3.1) (R15)         15.8.0           2019-12         RAN#86         RP-193042         0130         F         CR to 38.133 on TCI state switching (Clause 8.10) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0136         F         CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15         15.8.0           2019-12         RAN#86         RP-193042         0144         F         Editorial correction for SCell activation and deactivation delay R15         15.8.0           2019-12         RAN#86         RP-193040         0147         F         CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)         15.8.0           2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2         15.8.0           2019-12         RAN#86         RP-192993         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSC	2019-12	RAN#86	RP-192994	0126		F	CR on test cases for Redirection from NR in FR2 to NR in FR2	15.8.0
2019-12         RAN#86         RP-193042         0130         F         CR to 38.133 on TCl state switching (Clause 8.10) (R15)         15.8.0           2019-12         RAN#86         RP-192994         0136         F         CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15         15.8.0           2019-12         RAN#86         RP-193042         0144         F         Editorial correction for SCell activation and deactivation delay 15.8.0         15.8.0           2019-12         RAN#86         RP-193040         0147         F         CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3) 15.8.0         15.8.0           2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15 15.8.0         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2 15.8.0         15.8.0           2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement 15.8.0         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10) 15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS	2019-12	RAN#86	RP-192994	0128		F	CR on test cases for FR2 handover (clause A.7.3.1) (R15)	15.8.0
2019-12         RAN#86         RP-192994         0136         F         CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15         15.8.0           2019-12         RAN#86         RP-193042         0144         F         Editorial correction for SCell activation and deactivation delay         15.8.0           2019-12         RAN#86         RP-193040         0147         F         CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)         15.8.0           2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2         15.8.0           2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for SA SS							CR to 38.133 on TCI state switching (Clause 8.10) (R15)	
2019-12         RAN#86         RP-193042         0144         F         Editorial correction for SCell activation and deactivation delay         15.8.0           2019-12         RAN#86         RP-193040         0147         F         CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)         15.8.0           2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2         15.8.0           2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause         15.8.0			RP-192994			F	CR on TC with monitoring PDCCH not in first 3 OFDM symbols	
2019-12         RAN#86         RP-193040         0147         F         CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)         15.8.0           2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2         15.8.0           2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause A.3.10)         15.8.0	2019-12	RAN#86	RP-193042	0144		F		15.8.0
2019-12         RAN#86         RP-193041         0155         F         CR on NR MTTD and MRTD definition for R15         15.8.0           2019-12         RAN#86         RP-193039         0158         F         CR for SCell activation delay in FR2         15.8.0           2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause A.3.0)         15.8.0	2019-12					F	CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)	
2019-12         RAN#86         RP-193040         0160         F         CR for scheduling restriction due to L1-RSRP measurement         15.8.0           2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause In FR1)         15.8.0			RP-193041					15.8.0
2019-12         RAN#86         RP-192993         0166         1         F         CR on SSB setting for new gap and SMTC setting (Clause A.3.10)         15.8.0           2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause In FR1)         15.8.0							CR for SCell activation delay in FR2	
2019-12         RAN#86         RP-192995         0168         F         CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)         15.8.0           2019-12         RAN#86         RP-192995         0170         F         CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause 15.8.0)         15.8.0								
Clause A.4.7.3)   2019-12   RAN#86   RP-192995   0170   F   CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause   15.8.0					1			
							(Clause A.4.7.3)	
	2019-12	RAN#86	RP-192995	0170		F	· ·	15.8.0

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2019-12	RAN#86	RP-192993	0184		F	CR on cell-reselection test cases for NR SA FR2 R15	15.8.0
2019-12	RAN#86	RP-192995	0186		F	endorsed CR on intra-frequency measurement and reporting for EN-DC FR2 R15	15.8.0
2019-12	RAN#86	RP-192996	0188		F	endorsed CR on intra-frequency measurement and reporting for NR SA FR2 R15	15.8.0
2019-12	RAN#86	RP-192996	0190		F	endorsed CR on RLM scheduling restrictions for EN-DC FR2 R15	15.8.0
2019-12	RAN#86	RP-192996	0192		F	endorsed CR on RLM scheduling restrictions for NR SA FR2 R15	15.8.0
2019-12	RAN#86	RP-192992	0200	1	F	Correction to PRACH configuration index in test cases	15.8.0
2019-12	RAN#86	RP-193039	0208		F	Correction on the TCI state switching (clause 8.10)	15.8.0
2019-12	RAN#86	RP-193039	0214	1	F	CR for 38133 editorial for clause 8.1,8.8,8.9,8.10,8.11 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0215	1	F	CR for 38133 editorial for clause 8.5 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0216	1	F	CR for 38133 editorial for clause 9.3 in Rel-15	15.8.0
2019-12	RAN#86	RP-193040	0217	1	F	CR on 38133 for removal the duplicated reference in clause 2	15.8.0
2019-12	RAN#86	RP-193040	0218	1	F	CR on 38133 for clause 11 in Rel-15	15.8.0
2019-12	RAN#86	RP-192994	0224	2	F	CR on TC of UE transmit timing (A.4.4.1.1, A.5.4.1.1, A.6.4.1.1, A.7.4.1.1) Rel-15	15.8.0
2019-12	RAN#86	RP-193042	0229	1	F	Update on requirements related to inter-band EN-DC and NE-DC synchronous requirements	15.8.0
2019-12	RAN#86	RP-192995	0232	1	F	Editorial corrections to measurement accuracy tests	15.8.0
2019-12	RAN#86	RP-192992	0234		F	Corrections to SS-RSRQ and SS-SINR OTA tests with SA	15.8.0
2019-12	RAN#86	RP-192992	0236		F	Corrections to SS-RSRQ and SS-SINR OTA tests with EN-DC	15.8.0
2019-12	RAN#86	RP-193042	0238	1	F	Editorial corrections to clause 9.2	15.8.0
2019-12	RAN#86	RP-192992	0241		F	Corrections to band applicability of measurement accuracy tests	15.8.0
2019-12	RAN#86	RP-192996	0243	1	F	Introduction of bandwidth limited OCNG for OTA testing	15.8.0
2019-12	RAN#86	RP-192992	0247	1	F	Corrections to test cases for SA FR2 inter-frequency measurement (clause A.7.6.2)	15.8.0
2019-12	RAN#86	RP-193041	0249		F	CR to 38.133 NR reporting criteria	15.8.0
2019-12	RAN#86	RP-192993	0263	1	F	CR on correcting CSI-RS based BFD and link recovery tests for EN-DC in FR1	15.8.0
2019-12	RAN#86	RP-192993	0265	1	F	CR on correcting CSI-RS based BFD and link recovery tests for SA in FR1	15.8.0
2019-12	RAN#86	RP-192993	0267	1	F	CR on correcting CSI-RS based BFD and link recovery tests for EN-DC in FR2	15.8.0
2019-12	RAN#86	RP-192993	0269	1	F	CR on correcting CSI-RS based BFD and link recovery tests for SA in FR2	15.8.0
2019-12	RAN#86	RP-193040	0275	1	F	CR on delay uncertainty of RRC Release with redirection requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-193040	0277	1	F	CR on known condition of PSCell addition requirement in NE-DC	15.8.0
2019-12	RAN#86	RP-193041	0279	1	F	CR on known condition of PSCell addition requirement in NR DC	15.8.0
2019-12	RAN#86	RP-193041	0281	1	F	CR on RRC Re-establishment requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0283	2	F	CR on scope of interruption requirements of EN-DC in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0285	1	F	CR on scope of MTTD requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-192994	0287	1	F	CR on SSB-based RLM test case for EN-DC FR1	15.8.0
2019-12	RAN#86	RP-192994	0289	1	F	CR on SSB-based RLM test case for NR SA FR1	15.8.0
2019-12	RAN#86	RP-193042	0291	1	F	Editorial CR on clause 8.2	15.8.0
2019-12	RAN#86	RP-193041	0295	1	F	CR on NR inter-frequency identification	15.8.0
2019-12	RAN#86	RP-193041	0297	1	F	CR on NR intra-frequency measurements	15.8.0
2019-12 2019-12	RAN#86 RAN#86	RP-193039 RP-193041	0311 0313		F	Correction on CSSF within measurement gap (clause 9.1.5.2) CR on RLM scheduling restriction (clause 8.1.7)	15.8.0 15.8.0
2019-12	RAN#86	RP-193041	0315	1	F	CR on SCell activation requirements (clause 8.3.2)	15.8.0
2019-12	RAN#86	RP-193041	0317	-	F	CR to add QCL definition (clause 3.6)	15.8.0
2019-12	RAN#86	RP-192993	0317		F	CR on power offset in TRS RMC (A.3.17)	15.8.0
2019-12	RAN#86	RP-192995	0321		F	CR to introduce new PDCCH RMC (A.3.1.3.2)	15.8.0
2019-12	RAN#86	RP-192997	0323		F	Maintenance CR for measurement accuracy (clause 10.1)	15.8.0
2019-12	RAN#86	RP-192996	0325		F	FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15.8.0
2019-12	RAN#86	RP-192996	0327	1	F	A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15.8.0
2019-12	RAN#86	RP-192996	0329	-	F	A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0
2019-12	RAN#86	RP-192996 RP-192996	0329	1	F	FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0
2019-12	RAN#86	RP-192990	0333	1	F	L1-RSRP delay test FR1 EN-DC (clause A.4.6.3)	15.8.0
2019-12	RAN#86	RP-192997	0335		F	L1-RSRP delay test FR1 EN-DC (clause A.4.6.3)	15.8.0
2019-12	RAN#86	RP-192997	0337	1	F	L1-RSRP delay test FR1 SA (clause A.6.6.4)	15.8.0
2019-12	RAN#86	RP-192997	0339	<u> </u>	F	L1-RSRP delay test FR2 SA (clause A.7.6.3)	15.8.0
2019-12	RAN#86	RP-192996	0343		F	L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4)	15.8.0
2019-12	RAN#86	RP-192996	0345		F	L1-RSRP accuracy test FR2 SA (clause A.7.7.4)	15.8.0
2019-12	RAN#86	RP-193039	0357		F	CR 38.133 (8.3.2) Amendment of requirements depending on T_SMTC_Max	15.8.0
2019-12	RAN#86	RP-193039	0359		F	CR 38.133 (8.3.3) Correction of SCell deactivation delay	15.8.0
2019-12	RAN#86	RP-192992	0361		F	CR 38.133 (A.7.5.7) TCs for PSCell addition and release delay	15.8.0
2019-12	RAN#86	RP-192995	0365		F	CR to TS 38.133: New common clause with OTA related	15.8.0
2019-12	RAN#86	RP-192995	0367		F	definitions for FR2 testing (Rel-15) CR to TS 38.133: Configuration of NR FR1 cell in NR FR1-FR2	15.8.0
			ĺ			tests (Rel-15)	

2019-12	RAN#86	RP-192995	0369		F	CR to TS 38.133: Clarificatins to Antenna Configurations for FR2	15.8.0
2019-12	RAN#86	DD 102005	0371		F	(Rel-15) CR to TS 38.133: Corrections to CORESET RMCs (Rel-15)	15.8.0
2019-12	RAN#86	RP-192995 RP-192995	0371		F	CR to TS 38.133: Corrections to CORESET RIMCS (Rel-15)	15.8.0
2019-12	RAN#86	RP-192995 RP-193042	0375	1	F	Editorial updates (clause 9.4)	15.8.0
2019-12	RAN#86	RP-193039	0373	1	F	Correction in interruption requirements (clause 8.2)	15.8.0
2019-12	RAN#86	RP-193042	0377	1	F	Editorial updates (Annex B)	15.8.0
2019-12	RAN#86	RP-193040	0381		F	CR on 38133 for MRTD and MTTD in intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-192992	0384	1	F	CR for MAC-CE based TCI State switch for ENDC (Clause	15.8.0
2010 12	10 11 11/100	102002	0004	'	'	A.5.5.8)	10.0.0
2019-12	RAN#86	RP-192993	0385	1	В	CR for MAC-CE based TCI State switch for NR SA (Clause	15.8.0
20.0.2			0000			A.7.5.7)	. 0.0.0
2019-12	RAN#86	RP-192993	0386	1	В	CR for RRC based TCI State switch for NR SA (Clause A.7.5.7)	15.8.0
2019-12	RAN#86	RP-192993	0387	1	F	CR for RRC based TCI State switch for EN-DC (Clause A.5.5.8)	15.8.0
2019-12	RAN#86	RP-192992	0388	1	F	CR for FR1 handover test cases (Clause A.6.3.1.1, A.6.3.1.2,	15.8.0
						A.6.3.1.3)	
2019-12	RAN#86	RP-193041	0389	1	F	CR on MTTD for intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0397		F	CR on corrections on NR intra frequency measurement reporting	15.8.0
						requirements (Clause 9.2.4)	
2020-03	RAN#87	RP-200400	0404	1	F	[CR] handover requirements 38.133 R15	15.9.0
2020-03	RAN#87	RP-200400	0411	1	F	[CR] SCell activation delay 38.133 R15	15.9.0
2020-03	RAN#87	RP-200400	0416		F	Corrections to RRM Test case A.7.1.1.2	15.9.0
2020-03	RAN#87	RP-200400	0418		F	Correction to Active UL BWP for SA intra-frequency event	15.9.0
						triggered reporting with per-UE gaps	
2020-03	RAN#87	RP-200400	0420		F	Correction to FR1-E-UTRA Inter-RAT cell re-selection test cases	15.9.0
2020-03	RAN#87	RP-200400	0422		F	Removal of Time offset between PCell and PSCell in SA RRM	15.9.0
. == 00			1		1	Test cases	2.2.0
2020-03	RAN#87	RP-200400	0424		F	Correction to SRS periodicity and Offset for UL transit timing with	15.9.0
. == 00			1		1	DRx config	2.2.0
2020-03	RAN#87	RP-200400	0426		F	Update of Test Requirements, FR2 Intra-frequency SS-RSRP	15.9.0
						accuracy Test cases	
2020-03	RAN#87	RP-200400	0428		F	Update of Test requirements, FR2 Inter-frequency SS-RSRP	15.9.0
						accuracy Test cases	
2020-03	RAN#87	RP-200484	0438	2	F	CR on test cases for SA FR2 inter-frequency measurement R15	15.9.0
						(section A.7.6.2)	
2020-03	RAN#87	RP-200400	0444	1	F	Editorial corrections for 38.133 Perf Part R15	15.9.0
2020-03	RAN#87	RP-200400	0446		F	Editorial corrections for 38.133 Core Part R15	15.9.0
2020-03	RAN#87	RP-200400	0453		F	Editorial correction for active TCI state switching delay	15.9.0
2020-03	RAN#87	RP-200400	0461	1	F	Corrections for BWP switch delay R15	15.9.0
2020-03	RAN#87	RP-200400	0463		F	CR for reference correction on L1-RSRP measurement period	15.9.0
						(section 9.5.3)	
2020-03	RAN#87	RP-200400	0465		F	CR for measurement restriction in FR2 across CCs (section	15.9.0
						8.1.2.3, 8.1.3.3, 8.5.2.3, 8.5.3.3, 8.5.5.3, 8.5.6.3, 9.5.5.1, 9.5.5.2)	
2020-03	RAN#87	RP-200400	0467		F	CR for SSB based candidate beam detection (section 8.5.5.2)	15.9.0
2020-03	RAN#87	RP-200400	0487		F	CR to TS 38.133: Corrections to FR1-FR2 event triggered test	15.9.0
						cases Annex A.5 (Rel-15)	
2020-03	RAN#87	RP-200400	0489		F	CR to TS 38.133: Corrections to FR1-FR2 event triggered test	15.9.0
						cases Annex A.7 (Rel-15)	
2020-03	RAN#87	RP-200400	0491		F	CR to TS 38.133: Clarifications to AoA setup and AoA cell	15.9.0
						assignement Annex A.5 (Rel-15)	
2020-03	RAN#87	RP-200400	0493		F	CR to TS 38.133: Clarifications to AoA setup Annex A.8 (Rel-15)	15.9.0
2020-03	RAN#87	RP-200400	0495		F	CR to TS 38.133: Addition of TC A.4.7.2.2 (Rel-15)	15.9.0
2020-03	RAN#87	RP-200400	0499		F	Editorial correction of EN-DC FR1 L1-RSRP measurement for	15.9.0
						beam reporting	
2020-03	RAN#87	RP-200400	0501		F	Editorial correction of NR SA FR1 L1-RSRP measurement for	15.9.0
						beam reporting	
2020-03	RAN#87	RP-200400	0508		F	CR on removing one-shot timing adjustment requirements	15.9.0
2020-03	RAN#87	RP-200400	0515	1	F	Correction to BWP switching delay	15.9.0
2020-03	RAN#87	RP-200400	0517	1	F	Correction to inter-RAT measurement on LTE serving carrrier	15.9.0
2020-03	RAN#87	RP-200400	0519	1	F	Correction to configurations for TRS	15.9.0
2020-03	RAN#87	RP-200400	0521		F	Correction to FR1 SA inter-RAT measurement TCs	15.9.0
						NOTE The CR is not implemented because the changes in this CR were already implemented in the latest version of the specification.	
2020-03	RAN#87	RP-200400	0523		F	Correction to interruption TCs	15.9.0
						NOTE The CR is not implemented because some parts of changes in the CR were already implemented in the latest version of the specification.	
2020-03	RAN#87	RP-200400	0527		F	Correction to RF channels configuration	15.9.0

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2020-03	RAN#87	RP-200400	0531		F	Correction to UL reconfiguration delay TCs	15.9.0
2020-03	RAN#87	RP-200400	0537		F	CR on SSB RLM test cases EN-DC R15	15.9.0
2020-03	RAN#87	RP-200400	0539		F	CR on SSB RLM test cases SA R15	15.9.0
2020-03	RAN#87	RP-200400	0541		F	CR on cell reselection test cases for FR2 SA R15	15.9.0
2020-03	RAN#87	RP-200400	0543		F	OCNG pattern for TDM-ed SSB R15	15.9.0
2020-03	RAN#87	RP-200400	0563		F	NR editorial correction	15.9.0
2020-03	RAN#87	RP-200400	0579	1	F	CR 38.133 (8.11) Corrections to PSCell change delay	15.9.0
						requirements	
2020-03	RAN#87	RP-200400	0586		F	PRACH configurations in FR1 SSB based RLM tests	15.9.0
2020-03	RAN#87	RP-200400	0588		F	PRACH configurations in FR1 SSB based BFR tests	15.9.0
2020-06	RAN#88	RP-200987	0594	1	F	[CR] Editorial corrections for 38.133 R15 Core Part	15.10.0
2020-06	RAN#88	RP-200987	0597	1	F	[CR] Editorial corrections for 38.133 R15 Perf Part	15.10.0
2020-06	RAN#88	RP-200987	0601	1	F	CR to Intra-frequency handover from FR1 to FR1	15.10.0
2020-06	RAN#88	RP-200987	0605		F	CR to A.6.1.2.1 Cell reselection to higher priority E-UTRAN	15.10.0
2020-06	RAN#88	RP-200987	0607		F	Correction to General test parameters in A.6.6.1.2	15.10.0
2020-06	RAN#88	RP-200987	0619	1	F	CR on CSSF correction for R15 TS38.133	15.10.0
2020-06	RAN#88	RP-200987	0628	1	F	CR on Active TCI State Switching requirements - Rel15	15.10.0
2020-06	RAN#88			2	F		15.10.0
		RP-200988	0633			Rapportuer CR for TS38.133	
2020-06	RAN#88	RP-200987	0650		F	Add UE Beam assumption for RRM Test cases in A.7.3, A.7.4,	15.10.0
						A.7.7	
2020-06	RAN#88	RP-200987	0652		F	Add UE Beam assumption for RRM Test cases in A.5.3, A.5.4,	15.10.0
1						A.5.7	1
2020-06	RAN#88	RP-200987	0654		F	Update of FR2 RLM Test cases with 2 Angles of Arrival	15.10.0
2020-06	RAN#88	RP-200987	0656		F		15.10.0
						Update of Tx Timing Test cases	
2020-06	RAN#88	RP-200987	0658		F	Update of FR2 RLM and BFD-LR Test cases	15.10.0
2020-06	RAN#88	RP-200987	0660	<u> </u>	F	Update of FR2 SS-RSRP Test cases	15.10.0
2020-06	RAN#88	RP-200987	0662	1	F	CR on TCI state switch	15.10.0
2020-06	RAN#88	RP-200987	0664		F	CR on PDSCH RMC	15.10.0
2020-06	RAN#88	RP-200987	0679		F	Correction of CFRA RSRP threshold	15.10.0
				_			
2020-06	RAN#88	RP-200987	0695	1	F	CR on SMTC period for beam management requirements	15.10.0
2020-06	RAN#88	RP-200987	0697		F	CR for CSI-RS based L1-RSRP measurement period	15.10.0
2020-06	RAN#88	RP-200987	0699		F	CR on RACH test cases with CSI-RS resource R15	15.10.0
2020-06	RAN#88	RP-200987	0703		F	CR on TS38.133 for modification of the layer 3 and layer 1	15.10.0
					-	measurement sharing factor when both SSB and RSSI symbol to	
						be measured are considered	
2020 00	D 4 N # 0 0	DD 000007	0705		_		45.40.0
2020-06	RAN#88	RP-200987	0705		F	CR on TS38.133 for modification on number of cells and number	15.10.0
						of SSB to be measured for FR2 intra-frequency measurement	
2020-06	RAN#88	RP-200987	0707	1	F	[CR] TCI state switch delay 38.133 R15	15.10.0
2020-06	RAN#88	RP-200987	0714		F	Correction of NR SA FR2 inter-freq measurement reporting	15.10.0
2020-06	RAN#88	RP-200987	0726		F	CR: Correction of L1-RSRP measurement period	15.10.0
2020-06	RAN#88	RP-200987	0728	1	F	CR to TS 38.133: Correction to CSI-RS configurations in A.3.14	15.10.0
2020 00	117414#00	10 200007	0120	l '	'	(Rel-15)	13.10.0
2000 00	D 4 N 1 1/1 0 0	DD 000007	0700		_		45.40.0
2020-06	RAN#88	RP-200987	0730		F	CR to TS 38.133: Correction to SMTC configuration in	15.10.0
						measurement accuracy tests (Rel-15)	
2020-06	RAN#88	RP-200987	0732		F	CR to TS 38.133: Clarifications to AoA setup Annex A.5 (Rel-15)	15.10.0
2020-06	RAN#88	RP-200987	0734		F	CR to TS 38.133: Clarifications to AoA setup Annex A.7 (Rel-15)	15.10.0
2020-06	RAN#88	RP-200987	0737	1	F	Applicability of QCL	15.10.0
2020-06	RAN#88	RP-200987	0747	1	F	CR on Psharingfactor	15.10.0
2020-06	RAN#88	RP-200987	0749	1	F	CR on E-UTRAN Serving Cell Parameters	15.10.0
2020-06	RAN#88	RP-200987	0751	1	F	CR on Modified parameters for BFD TCs with 4Rx antenna	15.10.0
2020-06	RAN#88	RP-200987	0753	1	F	CR on BFD TCs	15.10.0
2020-06	RAN#88	RP-200987	0755	1	F	CR on UL carrier RRC reconfiguration Delay TC	15.10.0
2020-06	RAN#88	RP-200987	0757	1	F	CR to FR1 SCell activation delay test cases	15.10.0
2020-06	RAN#88	RP-200987	0759	1	F	CR to inter-frequency measurement TCs	15.10.0
					_		
2020-06	RAN#88	RP-200987	0761	1	F	CR to interruption TCs	15.10.0
2020-06	RAN#88	RP-200987	0776		F	CR on interruption due to Acitve BWP switch	15.10.0
2020-06	RAN#88	RP-200987	0780		F	CR on UE transmit timing	15.10.0
2020-06	RAN#88	RP-200987	0782		F	Editoral CR on TS 38.133 Rel-15	15.10.0
2020-06	RAN#88	RP-200987	0784		F	CR on RRC Connection Release with Redirection test cases	15.10.0
2020-06	RAN#88	RP-200987	0786		F	CR on RRC Re-establishment test cases	15.10.0
2020-06	RAN#88	RP-200987	0788		F	CR on Timing advance test cases for EN-DC	15.10.0
2020-06	RAN#88	RP-200987	0790		F	CR on Timing test cases for NR SA	15.10.0
2020-06	RAN#88	RP-200987	0798		F	Correction onTCI state switching R15	15.10.0
2020-06	RAN#88	RP-200987	0800		F	Accuracy of carrier aggregation in NR R15	15.10.0
2020-06	RAN#88	RP-200987	0812		F	CR 38.133 (8.10.5) Corrections to RRC-based TCI state change	15.10.0
				2	F		
2020-06	RAN#88	RP-200987	0815	^	Г	CR 38.133 (8.3.2) Corrections to SCell Activation delay	15.10.0
	ļ		ļ			requirements	$\downarrow$
2020-06	RAN#88	RP-200987	0820	<u></u>	F	CR on FR2 measurement requirements outside gaps R15	15.10.0
2020-06	RAN#88	RP-200987	0822		F	CR on inter-RAT RSTD requirements for NE-DC in 38.133 R15	15.10.0
2020-06	RAN#88	RP-200987	0824	1	F	CR on SCell activation requirements R15	15.10.0
2020-06	RAN#88	RP-200987	0826		F	CR on SSB based L1-RSRP measurement R15	15.10.0
2020-06	RAN#88	RP-200987	0828		F	CR on L1-RSRP delay tests for FR2 R15	15.10.0
2020-06	RAN#88	RP-200987	0830		F	CR to L1-RSRP accuracy TC for FR2 EN-DC R15	15.10.0
		DD 000007	10000		F	CR to L1-RSRP accuracy TC for FR2 SA R15	1 4 5 4 0 0
2020-06	RAN#88	RP-200987	0832		ᆫ	CK to E1-KSKP accuracy TC for FK2 SA K 15	15.10.0

2020-06	RAN#88	RP-200987	0834		F	CR to TCI state switch TC R15	15.10.0
2020-06	RAN#88	RP-200987	0866		F	Clarification on RLM	15.10.0
2020-09	RAN#89	RP-201512	0888		F	CR to Redirection from NR in FR1 to E-UTRAN	15.11.0
2020-09	RAN#89	RP-201512	0890		F	CR to timing advance adjustment accuracy in FR1	15.11.0
2020-09	RAN#89	RP-201512	0894		F	CR to SS-RSRQ Intra-Frequency and Inter-frequency FR1 measurement accuracy	15.11.0
2020-09	RAN#89	RP-201512	0896		F	Update to FR2 240kHz SSB Configurations	15.11.0
2020-09	RAN#89	RP-201512	0898		F	Update of FR2 Random Access Test cases	15.11.0
2020-09	RAN#89	RP-201512	0900		F	Update to FR2 event-triggered reporting RRM Test cases in A.5.6 and A.7.6	15.11.0
2020-09	RAN#89	RP-201512	0902		F	Update to FR2 SS-RSRP RRM Test cases in A.5.7 and A.7.7	15.11.0
2020-09	RAN#89	RP-201512	0904		F	CR to EN-DC timing advance adjustment accuracy in FR2	15.11.0
2020-09	RAN#89	RP-201512	0906		F	CR to configuration of CSI-RS for tracking	15.11.0
2020-09	RAN#89	RP-201512	0908	1	F	Update of RRC-based Active BWP Switch test cases	15.11.0
2020-09	RAN#89	RP-201512	0910		F	Update to FR2 Annex B RRM side conditions	15.11.0
2020-09	RAN#89	RP-201512	0912		F	Add UE Beam assumption for RRM Test cases in A.5.5	15.11.0
2020-09	RAN#89	RP-201512	0921		F	Add UE Beam assumption for RRM Test cases in A.7.5 Rel-15	15.11.0
2020-09	RAN#89	RP-201512	0932		F	CR for TS38.133 Rel-15, Correction for RRM core requirements	15.11.0
2020-09	RAN#89	RP-201512	0934	1	F	CR for TS38.133 Rel-15, Correction for test cases of BWP switching	15.11.0
2020-09	RAN#89	RP-201512	0945	1	F	CR on TS38.133 for handover test cases	15.11.0
2020-09	RAN#89	RP-201512	0947		F	CR on TS38.133 for introducing the PDSCH RMC configuration in cell re-selection test cases	15.11.0
2020-09	RAN#89	RP-201512	0955	1	F	CR on FR2 measurement capability for R15	15.11.0
2020-09	RAN#89	RP-201512	0962		F	CR on Inter-RAT RSTD measurements (section 9.4.4)	15.11.0
2020-09	RAN#89	RP-201512	0964	1	F	CR on active BWP switch in R15	15.11.0
2020-09	RAN#89	RP-201512	0985		F	CR for SCell activation delay in FR2 in R15	15.11.0
2020-09	RAN#89	RP-201512	0987	1	F	CR on TCI state switch delay in R15	15.11.0
2020-09	RAN#89	RP-201512	1002	1	F	Fine/rough beam assumption for idle mode and measurement procedure test case	15.11.0
2020-09	RAN#89	RP-201512	1022		F	Clarification of SNR values in RLM Test cases	15.11.0
2020-09	RAN#89	RP-201512	1024		F	CR to TS 38.133: Corrections to CSI-RS configurations in A.3.14 (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1026		F	CR to TS 38.133: Corrections to event triggered test cases (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1028		F	CR to TS 38.133: Corrections to inter-RAT test cases (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1030		F	CR to TS 38.133: Corrections to AoA setup information in some	15.11.0
						test cases (Rel-15)	
2020-09	RAN#89	RP-201512	1032	1	F	CR on maintaining handover tests in Rel-15	15.11.0
2020-09	RAN#89	RP-201512	1047	1	F	CR on reporting criteria for EN-DC in 38.133 R15	15.11.0
2020-09	RAN#89	RP-201512	1049	1	F	CR on test cases for Active TCI state switch delay R15	15.11.0
2020-09	RAN#89	RP-201512	1051	1	F	Addition of new default configurations for RMC scheduling	15.11.0
2020-09 2020-09	RAN#89	RP-201512	1053	1	F	Correction to beam failure detection and link recovery test cases	15.11.0
2020-09	RAN#89 RAN#89	RP-201512 RP-201512	1055 1057	'	F	Correction to BWP switching delay test cases  Correction to FR1 intra-frequency measurement with gap test	15.11.0 15.11.0
2020-09	RAN#89	DD 201512	1050	1	_	Cases	1E 11 O
2020-09	RAN#89	RP-201512 RP-201512	1059 1069	- 1	F	Correction to inter-RAT HO test cases  CR on correction to CSSF within gap R15	15.11.0 15.11.0
2020-09	RAN#89	RP-201512	1009	1	F	CR on SCell activation requirements R15	15.11.0
2020-09	RAN#89	RP-201512	1073	1	F	CR on BWP switching delay requirements R15	15.11.0
2020-09	RAN#89	RP-201512	1074	1	F	CR on UL BWP configuration for RRM test cases R15	15.11.0
2020-09	RAN#89	RP-201512	1076	1	F	CR to add UE beam assumption for TC in A.5.6 R15	15.11.0
2020-09	RAN#89	RP-201512	1096	1	F	CR to 38.133: Correction to RRC basd BWP switch delay requirements	15.11.0
2020-09	RAN#89	RP-201512	1098	1	F	CR to 38.133: Correction to interruption requirements for per-FR gap in FR2	15.11.0
2020-09	RAN#89	RP-201512	1110		F	[CR] Replacing x in references with correct numbers (Core R15 Cat F)	15.11.0
2020-09	RAN#89	RP-201512	1112		F	[CR] Replacing x in references with correct numbers (Perf R15 Cat	15.11.0
2020-12	RAN#90	RP-202487	1118	1	F	RB allocation and Noc level in RLM Test cases	15.12.0
2020-12	RAN#90	RP-202487	1120	Ė	F	Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6	15.12.0
2020-12	RAN#90	RP-202487	1122		F	240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases	15.12.0
2020-12	RAN#90	RP-202487	1124	1	F	Correct UE beam assumption for Test Cases in A.5.6	15.12.0
2020-12	RAN#90	RP-202487	1126	1	F	Aggregation level of CORESET for RMC scheduling	15.12.0
2020-12	RAN#90	RP-202487	1128		F	Clarify FR1 NSA SS-SINR measurement TCs	15.12.0
2020-12	RAN#90	RP-202487	1130		F	FR1 Inter-frequency Event triggered Reporting tests in DRX	15.12.0
2020-12	RAN#90	RP-202487	1132		F	E-UTRAN	15.12.0
2020-12	RAN#90	RP-202486	1145	1	F	CR on CSI-RS BW condition for BFD/CBD R15	15.12.0
2020-12	RAN#90	RP-202486	1147	1	F	CR on AP-CSI-RS based L1-RSRP measurement R15	15.12.0
2020-12	RAN#90	RP-202487	1159	_	F	CR on TS38.133 for cell activation and deactivation test case	15.12.0
0000 10			1161	4	F	CR on TS38.133 for cell reselection test case	15.12.0
2020-12	RAN#90	RP-202487					
2020-12 2020-12 2020-12	RAN#90 RAN#90	RP-202487 RP-202487	1163 1167	1	F	Correction of active BWP switch test case CR for TS38.133 Rel-15, Correction for RRM core and test cases	15.12.0 15.12.0

2020-12	RAN#90	RP-202486	1195		F	CR on carrier frequency range of PCell/PSCell for the maximum number of RLM-RS resources	15.12.0
2020-12	RAN#90	RP-202486	1201	1	F	CR on MO merge in R15	15.12.0
2020-12	RAN#90	RP-202487	1208	1	F	Correction on beamFailureInstanceMaxCount for test case of availability restriction during FR2 BFR in R15	15.12.0
2020-12	RAN#90	RP-202487	1215		F	Correction of RRM tests	15.12.0
2020-12	RAN#90	RP-202487	1224		F	Correction to types of requirements in annex A	15.12.0
2020-12	RAN#90	RP-202487	1226	1	F	Corrections to frequency range in interfrequency measurement procedures tests	15.12.0
2020-12	RAN#90	RP-202487	1229		F	Correction on TBD values in FR1+FR2 interfrequency RSRP accuracy tests	15.12.0
2020-12	RAN#90	RP-202486	1231		F	Addition of symbol definitions	15.12.0
2020-12	RAN#90	RP-202487	1235	1	F	Square bracket removal in 38.133 section A.1 to A.5	15.12.0
2020-12	RAN#90	RP-202487	1237	1	F	Square bracket removal in 38.133 section A.6 to A.8	15.12.0
2020-12	RAN#90	RP-202486	1251	1	F	CR to TS 38.133 on DCI based BWP switch requirements applicability	15.12.0
2020-12	RAN#90	RP-202487	1258	1	F	Correction to CSI-RS RMC configuration R15	15.12.0
2020-12	RAN#90	RP-202487	1260	1	F	Correction to cell reselection test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1262	1	F	Correction to inter-RAT handover test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1264	1	F	Correction to NR measurement under LTE SA test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1266	1	F	Correction to inter-RAT SFTD measurement test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1270		F	CR on maintaining BFD/CBD measurements test cases R15	15.12.0
2020-12	RAN#90	RP-202486	1295	1	F	CR on RRC-based BWP switch requirements	15.12.0
2020-12	RAN#90	RP-202487	1297	1	F	CR on RRC-based active TCI state switch test case Rel-15	15.12.0
2020-12 2020-12	RAN#90 RAN#90	RP-202486 RP-202487	1310 1312	1	F	[CR] Specify RRC processing delay in TCI state switching delay [CR] NR Perf Maintenance R15 Cat F	15.12.0
2020-12				1			15.12.0
2020-12	RAN#90 RAN#90	RP-202486 RP-202487	1316 1318	- 1	F	CR on SCell activation requirements R15 CR on FR2 unkown SCell activation test cases R15	15.12.0 15.12.0
2020-12	RAN#90	RP-202487	1320		F	CR on BWP in L1-RSRP delay and accuracy test cases R15	15.12.0
2020-12	RAN#90	RP-202486	1335	1	F	Introducing reference to the source of the Lmax and NRLM.	15.12.0
2020-12	RAN#90	RP-202487	1341	1	F	CR to TS 38.133: Corrections to inter-RAT FR1 test cases (Rel-15)	15.12.0
2020-12	RAN#90	RP-202487	1343	1	F	CR to TS 38.133: Corrections to inter-RAT FR2 test cases (Rel-15)	15.12.0
2020-12	RAN#90	RP-202487	1349	'	F	CR 38.133 Corrections to test cases for TCI state switching	15.12.0
2020-12	RAN#90	RP-202487	1363	1	F	Removal of annex B.2.6 on one shot timing adjustment in 38.133	15.12.0
2020-12	RAN#90	RP-202487	1365	1	F	Correction to NR FR1 DL active BWP switch of Cell with non-DRX in SA (A.6.5.6.2.1)	15.12.0
2020-12	RAN#90	RP-202486	1371	2	F	CR to 38.133 on Active BWP switch and Active TCI State Switching requirements - Rel15	15.12.0
2021-03	RAN#91	RP-210116	1404	1	F	CR on correcting SSB and RACH configuration in CSI-RS based beam failure detection and link recovery tests	15.13.0
2021-03	RAN#91	RP-210116	1416	1	F	[CR] RRM test case maintenance R15 Cat F	15.13.0
2021-03	RAN#91	RP-210116	1422	1	F	Update FR2 Reference channels and OCNG for FR2 RRM Test cases	15.13.0
2021-03	RAN#91	RP-210116	1425		F	CR to FR1 SA SS-SINR measurement TCs	15.13.0
2021-03	RAN#91	RP-210116	1428		F	CR on E-UTRA carrier for EN-DC event triggered reporting tests	15.13.0
2021-03	RAN#91	RP-210116	1431		F	Add missing FR2 Test case setups and Beam assumptions	15.13.0
2021-03	RAN#91	RP-210116	1494		F	Correction to cell reselection test case	15.13.0
2021-03	RAN#91	RP-210116	1503		F	Update of DRX configuration in FR1 Event-triggered Test cases	15.13.0
2021-03	RAN#91	RP-210116	1512		F	Correction on PRACH configuration for FR2 Non-Contention based Random Access in R15	15.13.0
2021-03	RAN#91	RP-210116	1515	1	F	Correction on PRACH configuration for Beam Failure Detection and Link Recovery Test in R15	15.13.0
2021-03	RAN#91	RP-210116	1518		F	Correction on PRACH RMC for FR1 CSI-RS based Non- Contention based Random Access for BFR in R15	15.13.0
2021-03	RAN#91	RP-210117	1537	2	F	CR on Scell activation delay maintenance (R15)	15.13.0
2021-03	RAN#91	RP-210116	1545		F	CR for test requirements correction of SA event triggered reporting tests for FR1 inter-frequency measurements with SSB time index	15.13.0
2021-03	RAN#91	RP-210117	1548	1	F	detection when DRX is used CR on R15 remaining issues	15.13.0
2021-03	RAN#91	RP-210117	1563	1	F	Correction on the power of the first preamble for random access in EN-DC and SA in R15	15.13.0
2021-03	RAN#91	RP-210116	1566	2	F	Correction on the time for Scell activation and CSI-report in R15	15.13.0
2021-03	RAN#91	RP-210116	1569	1	F	Correction on the Noc level in TS38.133 in R15	15.13.0
2021-03	RAN#91	RP-210117	1605	1	F	CR on the filter for beam failure indications in 38.133	15.13.0
2021-03	RAN#91	RP-210116	1614		F	Correction to Aperiodic CSI-RS configurations R15	15.13.0
2021-03	RAN#91	RP-210116	1617		F	Correction to radio link monitoring test cases R15	15.13.0
2021-03	RAN#91	RP-210116	1620	2	F	Correction to beam failure recovery test cases R15	15.13.0
	RAN#91	RP-210116	1623	1	F	Correction to L1-RSRP reporting delay test cases R15	15.13.0
2021-03		RP-210122	1634	2	F	CR on maintaining Antenna configurations in TS38.133 R15	15.13.0
2021-03	RAN#91	KF-210122					
2021-03 2021-03	RAN#91	RP-210122	1637	1	F	CR on test requirements for measurement performance tests R15	15.13.0
2021-03				1	F	Correction on test cases of inter-frequency Measurements R15	15.13.0 15.13.0
2021-03 2021-03	RAN#91	RP-210122	1637				

2021-03	RAN#91	RP-210116	1749		F	CR on test cases for inter-RAT measurement r15	15.13.0
202:00		2.01.0				CR on SCell activation delay, cell idenfication requirements on	1011010
2021-03	RAN#91	RP-210117	1752	2	F	deactivated SCell and inter-RAT ECID requirements for NE-DC R15	15.13.0
2021-03	RAN#91	RP-210116	1755	1	F	CR on SCell activation TCs R15	15.13.0
2021-03	RAN#91	RP-210116	1779	2	F	Cat-F CR to addition of TRS Configurations in Rel-15 Test Cases	15.13.0
2021-06	RAN#92	RP-211080	1810	1	F	CR to Interruptions during measurements on deactivated NR SCC	15.14.0
		RP-211083	1813		F	CR to CSI-RS based L1-RSRP measurement on resource set with	
<u>2021-06</u> 2021-06	RAN#92 RAN#92	RP-211084	1816		F	repetition off TCs CR to the notation of SMTC in the general test parameters of Re-	15.14.0 15.14.0
	_					establishment TCs	
2021-06	RAN#92	RP-211084	1819		F	CR to BWP configuration for interruption test case.	15.14.0
2021-06	RAN#92	RP-211080	1825	1	F	Update of DRX configuration in Event-triggered Test cases	15.14.0
2021-06	RAN#92	RP-211081	1831	1	F	Update RRM Test cases where 66RBs gives insufficient dB range	15.14.0
2021-06	RAN#92	RP-211081	1834	1	F	Update Reference channels and OCNG for FR2 240kHz SSB SCS RRM Test cases	15.14.0
2021-06	RAN#92	RP-211081	1837	1	F	Cat-F CR to Cell Reselection Tests with Async Cells in Rel-15	15.14.0
2021-06	RAN#92	RP-211081	1842	1	F	Cat-F CR to FR2 CORESET and Search Space RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1845		F	Cat-F CR to PDSCH RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1848		F	Cat-F CR to TRS Configuration in Rel-15 Test Case	15.14.0
2021-06	RAN#92	RP-211081	1855	1	F	Maintenance CR for test cases - R15	15.14.0
2021-06	RAN#92	RP-211085	1862		F	CR on BFD and link recovery test cases	15.14.0
2021-06	RAN#92	RP-211080	1885	1	F	Maintenance on CSSF for EN-DC and deactivated SCell measurement R15	15.14.0
2021-06	RAN#92	RP-211080	1896	1	F	Core requirement maintenance on signal characteristics (R15)	15.14.0
2021-06	RAN#92	RP-211081	1928	1	F	Correction on the SS-RSRP difference value for SS-RSRP measurement TC in R15	15.14.0
2021-06	RAN#92	RP-211081	1931	1	F	Correction on the CSI-reporting period for SCell activation delay in R15	15.14.0
2021-06	RAN#92	RP-211080	1938	1	F	CR on scheduling restriction of UE during intra-frequency	15.14.0
2021-06	RAN#92	RP-211087	1981		F	measurements on FR2 in R15 CR to TS 38.133: Correction of TDD Configuration for several TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211081	1984	1	F	CR to TS 38.133: Correction of OCNG pattern for several TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211087	1987		F	CR to TS 38.133: Correction of IRAT TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211087	1990		F	CR to TS 38.133: Corrections to SS-RSRP/RSRQ/SINR accuracy	15.14.0
						TCs (Rel 15)	
2021-06	RAN#92	RP-211080	1993	1	F	CR to TS 38.133: Several corrections to TCs (Rel 15)	15.14.0
2021-06	RAN#92	RP-211087	2031		F	CR on measurement on deactivated SCell and interruption to NR serving cells for measurements on deactivated NR Scell	15.14.0
2021-06	RAN#92	RP-211088	2056		F	Correction to CSI-RS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211089	2063		F	Correction to TRS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211081	2066	1	F	Correction to FR1 test cases using DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2070		F	Correction to reference configurations related to DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2072		F	Correction to interruption during measurement on deactivated SCell test cases_R15	15.14.0
2021-06	RAN#92	RP-211089	2074		F	Correction of test parameters for SA inter-frequency event triggered reporting TCs	15.14.0
2021-06	RAN#92	RP-211080	2103	1	F	CR on Rel-15 SCell activation, SMTC determination and UL timing 38133	15.14.0
2021-06	RAN#92	RP-211090	2109		F	CR on NR-DC PSCell addition and release delay in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2112	1	F	Maintenance CR for RRM test cases in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2137	1	F	Correction to AoA setup in FR2	15.14.0
2021-09	RAN#93	RP-211922	2197		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2200		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 1 (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2203		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 2 (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2206		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 3 (Rel-15)	15.15.0
2021-12	RAN#94	RP-212854	2237		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.16.0
2021-12	RAN#94	RP-212855	2240		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance (Rel-15)	15.16.0
2022-03	RAN#95	RP-220337	2270		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.17.0
2022-03	RAN#95	RP-220337	2273	1	F	Big CR to TS 38.133: NR_newRAT-Perf maintenance (Rel-15)	15.17.0
2022-06	RAN#96	RP-221660	2311	1	F	CR to maintain test case of PScell addition and release delay (A4.5.7)_R15	15.18.0
			2404		F	Big CR for TS 38.133 Core Maintenance Part-1 (Rel-15)	15.18.0
2022-06	RAN#96	RP-221655	2404				
2022-06 2022-06		RP-221655 RP-221655	2404		F		15.18.0
2022-06	RAN#96	RP-221655	2407		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15)	
2022-06 2022-06	RAN#96 RAN#96	RP-221655 RP-221660	2407 2410		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-1 (Rel-15)	15.18.0
2022-06 2022-06 2022-06	RAN#96 RAN#96 RAN#96	RP-221655 RP-221660 RP-221660	2407 2410 2413		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-1 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-2 (Rel-15)	15.18.0 15.18.0
2022-06 2022-06	RAN#96 RAN#96	RP-221655 RP-221660	2407 2410		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-1 (Rel-15)	15.18.0

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2022-12	RAN#98-e	RP-223293	2674	1	F	CR to CSI-RS, RLM and BWP switching in annex	15.20.0
2022-12	RAN#98-e	RP-223293	2677	1	F	Update on Scell activation and deactivation and Control Channel	15.20.0
						RMC for RLM FR2 (Rel-15)	
2022-12	RAN#98-e	RP-223292	2680		F	Update to L1-RSRP test scenarios (Rel-15)	15.20.0
2022-12	RAN#98-e	RP-223293	2693	1	F	R15 Cat-F CR testcase correction from R15 TS 38.133	15.20.0
2022-12	RAN#98-e	RP-223292	2700		F	CR on test case correction for timing advance	15.20.0
2022-12	RAN#98-e	RP-223293	2709	1	F	CR on TC for known PSCell addition in R15	15.20.0
2022-12	RAN#98-e	RP-223292	2712		F	CR on TC for inter-RAT NR Cell reselection in R15	15.20.0
2022-12	RAN#98-e	RP-223293	2747	2	F	Correction on Aperiodic CSI-RS RMCs and RLM in-sync test	15.20.0
0000 00	DANIIIO	DD 000505	0700		_	cases for R15	45.04.0
2023-03	RAN#99	RP-230505	2793	1	F	CR on TC for FR2 inter-frequency relative accuracy in R15	15.21.0
2023-03	RAN#99	RP-230504	2797		F	CR on TC for known PSCell addition in R15	15.21.0
2023-03	RAN#99	RP-230504	2801		F	CR to SNR on RLM-RS2 for FR2 CSI-RS based RLM OOS/IS	15.21.0
						tests	
2023-03	RAN#99	RP-230505	2805	1	F	CR to SNR of q0 level for BFD and LR in FR2	15.21.0
2023-03	RAN#99	RP-230504	2809		F	CR to ConfigNo of SSB Configuration and CSI-RS for tracking in	15.21.0
						redirection test	
2023-03	RAN#99	RP-230505	2828	2	F	R15 Cat-F CR SA NR-LTE HO testcase correction	15.21.0
2023-03	RAN#99	RP-230504	2943	1	F	CR on measurement requirements with per-FR gap R15	15.21.0
2023-06	RAN#100	RP-231357	3109		F	CR on relationship between SNR, RSRP level and thresholds for	15.22.0
						FR1 BFD and LR	
2023-06	RAN#100	RP-231357	3113		F	CR on R15 NR Inter-RAT measurements testcase correction	15.22.0
2023-06	RAN#100	RP-231357	3121		F	CR to TS 38.133: Corrections to NR RRM test cases (Rel 15)	15.22.0
2023-06	RAN#100	RP-231357	3140		F	CR to FR2 RLM In-syn test cases (Cat-F Rel-15)	15.22.0
2023-06	RAN#100	RP-231355	3154		F	CR of known cell condition for HO on 38.133 R15	15.22.0
2023-06	RAN#100	RP-231358	3195	1	F	Correction to inter-RAT NR measurement TCs_R15	15.22.0
2023-06	RAN#100	RP-231357	3199		F	Correction to inter-frequency NR measurement TCs_R15	15.22.0
2023-06	RAN#100	RP-231358	3274		F	CR on maintaining antenna connections for 4Rx capable UEs R15	15.22.0
2023-06	RAN#100	RP-231356	3292	1	F	CR on R15 SCell activation	15.22.0
2023-06	RAN#100	RP-231355	3328		F	38.133 CR on interruptions at SCell activation and deactivation	15.22.0

# 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					
V15.8.0	February 2020	Publication					
V15.9.0	April 2020	Publication					
V15.10.0	September 2020	Publication					
V15.11.0	December 2020	Publication					
V15.12.0	February 2021	Publication					
V15.13.0	June 2021	Publication					
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V15.16.0	April 2022	Publication					
V15.17.0	May 2022	Publication					
V15.18.0	July 2022	Publication					
V15.19.0	January 2023	Publication					
V15.20.0	January 2023	Publication					
V15.21.0	June 2023	Publication					
V15.22.0	July 2023	Publication					